THE BIRTH OF MUSIC THEORY

UNIVERSALISM and RELATIVISM

in

SUMERIAN-BABYLONIAN MUSICOLOGY

Second edition

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FOREWORD

EVIDENCE, PROOF AND FACT

Evidence + Proof of the Evidence = Fact

In the field of academic research, as it is the case with all scientific, legal and other matters where probity is paramount, there are two rules which may never be set aside.

1) The first rule is that any postulation claimed indubitable by its originator not only must be supported by evidence but most importantly it must be confirmed, beyond any reasonable doubt, by the proof of the evidence put forward before it can reach the status of fact.

2) Secondly, the burden of proof is the duty of the author of the postulation, and must not come from any secondary source unless the proof of the evidence is produced by and within that 'secondary source'. Any hypothesis not supported by these two rules must remain assumptive and should it be advanced as fact it would only be taken as deceptive dogmatism. Therefore the epistemological hierarchy of veracity consists, from the top, of fact, which is evidence demonstrated and proven without doubt. All other propositions which cannot put forward proof of evidence can only remain hypotheses, assumptions, theories, and so forth, and must be unequivocally qualified as such.

Additionally, any research must differentiate texts which are prescriptive from those which are descriptive, as the former may be construed as proof of evidence or fact while the latter only constitute evidence. However, certain scholars have used inference under the guise of fact. This is regrettable falsification.

It is academically legitimate to put forward hypotheses, assumptions and theories as long as these remain clearly labelled as such. Assumptions and the like are useful as they often contribute to the reaching of facts, should all the evidential elements be present in the pool of knowledge which lays in front off the researcher.

In the field of archaeomusicological researches, another dimension adds to the complexity of reaching the status of fact. This arises from chronology. Certain researchers have used posterioricism[1] which consists in making up theories of the past under the influence of more recent theories, some of them distanced from the former by as much as a thousand years from the latter - hardly a scientific method.

I now come to the unethical usage of selected foot-notes, or references in various works, lectures and conferences, etc., which support only the thesis of the author. Any serious research must compulsorily include such notes which agree, as well as, and in equal quantity, notes which disagree with the author, for a synthesis to be drawn without which the research is worthless, and it is, additionally, the duty of the reader to counter-check all notes without which, the reading is also pointless. As far as I am concerned, the absence of notes is better than subjectivist ones as it is better to make one's own mind. Therefore you will not be surprised by the few of them in this book as I am confident the reader knows where to look for them, this is what libraries are for.

PRELIMINARY

It would be unacademic to analyse any of the texts in the Babylonian musicological corpus, the most important of which discussed in the present work, independently from one another, or in the chronological order in which they were written, for the reason that some of them, although inscribed in the middle of the first millennium BC, for example, may be copies of much older theories, some conceptualised, perhaps, as early as the second millennium BC.

1. Atque haec est domini doctoris posterioritice qui, quum sibi iam prius fas esse scripserit, coronam regiam conspergere et conspurcare stercoribus: an non nobis fas erit posterius, huius posterioristicae linguam stercoratam, pronunciare dignissimam: ut uel meientis mulae posteriora lingat suis prioribus: donec rectius ex prioribus, didicerit posteriores concludere. [[T]hat is, the posterioristic premise of the honoured doctor. Since he has written that he already has a prior right to bespatter and besmirch the royal crown with shit, will we not have the posterior right to proclaim the beshitted tongue of this practitioner of posterioristics most fit to lick with his anterior the very posterior of a pissing she-mule until he shall have learned more correctly to infer posterior conclusions from prior premises!]. In Responsio ad Convitia Martini Lutheri, Opera Omnia, Louvain (1565: K3r-V3); Opera omnia, Frankfurt (1589: D2r-T1v). For details of the chronology and the textual history, see preface/commentary in More, ed. Headley (1969) [CW 5,2] esp. 832-845. (See eds. David A. Lines, Marc Laureys, Jill Kraye. Uwe Bauman, The Humanistic and Religious Controversies of Thomas More (1477/8-1535): A Typology of Literary Forms and Genres? Forms of Conflict and Rivalries in Renaissance Europe V&R Unipress GmbH.

Dating a tablet is not necessarily dating the theory it prescribes and therefore posterioriscism is unacceptable although some have ignored the principle to build-up theories that suited their views.

Some cuneiform texts are descriptive (lexical) and some are prescriptive (systemic). As we shall see later, text CBS 10996 is descriptive as it is a lexical list which does not give any instructions and therefore should never be used to explain a system.

INTRODUCTION

For the past sixty years to this day, there has been a small group of fundamental[2] Assyriologists[3] supported by a handful of Hellenocentrists who perceive that Sumero-Babylonian music theory from a Universalist[4] perspective and promote that Occidental music theory is prevalent. In fact, Universalists have set rules from their perceptions[5] of what theory should be, without any evidence, proof, or basis for the veridicality of their own perceptions.

2. Here I use the term fundamental to define the resolute attachment to a set of exclusive beliefs in the Supremacist Universalism of Western music theory.

3. Most 'music-Assyriologists' are a rare hybrid of scholars having published some cuneiform texts of Ancient Near-Eastern theoretical musicology with some token knowledge probably picked-up at primary school; these scholars constructed their reputation as experts in musicology on the basis that having a doctorate, or some other academic degree in Assyriology, their knowledge would have, by some hitherto unknown osmotic process, permeated through a transformative membrane whereby their limited cognition of music metamorphosed into musicological expertise. This is how a Professor who will remain anonymous, probably the least competent musicologist ever, has dominated the scene of music archaeology since 1960, and rejected dozens of competent articles either because she could not understand them, or that the articles contradicted her own. Her reputation reached the Grove where her entry on music theory, as absurd it may be, is considered as the most authoritative account on the basis that she is a Professor of Assyriology. A few Hellenists joined these Assyriologists with the aim of minorising the seminal importance of Mesopotamian musicology in order to preserve the Occidental supremacism of Hellenic musicology.

4. Universalism is the philosophical and theological concept that some ideas have universal application or applicability. A belief in one fundamental truth is another important tenet in Universalism.

5. Our perceptual experiences can be analysed by standard methodological criteria from which we may find that our perceptions are mostly very reliable and objective but only if we take 'objective' as consensual among different observers. However, we still cannot give something in evidence about physical reality. It seems that knowledge about the physical properties of things cannot be gained by perception, so perception is neither 'veridical' nor 'valid' in the strict sense of the words - the properties of the 'thing in itself' remain indeterminate in any empirical sense.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4116780/ Last accessed: 08/09/202.

As a Cultural Relativist, I am opposed to Universalist theories because they are logically absurd, but most importantly because they flaunt unashamed Supremacism. I contend that music theories are culturally dependent, and warn Universalists against all forms of generalisation. Universalists analyse Babylonian texts of theory with the tools of modern Western musicology, exclusively. Is it not more reasonable to apprehend Babylonian music theory as Babylonians themselves would have conceived it, that is with what we know - or the little we know - they knew. Is it not better than analysing Babylonian theory with modern Occidental knowledge to the risk of ascribing Babylonians with the invention of concepts which they could not have imagined at that time?

It is from these elucubrations that Universalists have drawn most extra-ordinary conclusions and adhere to them in the same way Neo-Creationists believe in a six plus one rest day-creation, perhaps a Universalist paradigm?

In the course of my analysis of the seminal texts of Ancient Near-Eastern musicology, I shall refrain from burdening my work with references to articles (unless essential) written by Universalists since most of what they say rests on a flawed basis which for reasons of probity I cannot incorporate into my own work.

LIMINARY

Ipse se nihil scire id unum sciat

Music was not born. Neither was language. Both came bound to one another as proto or palæo-melodic syllables for lack of better terms, from the deepest rifts where the entwined roots of Darwin's tree held onto the rugged particles of human evolution. These melodic syllables were intangible for they came from the mouth, yet unwritten for hundreds of thousands of years to come. Initially they would have been voiced as the respons to a stimulus. A caress, for instance, provoking a basic melodic syllable from the recipient and which in turn would become a recipient's desire for an amorous fondle or the like. It was probably the order, the manner, or the mood of the intonation, which eventually distinguished the melodic syllable of the respons from the melodic syllable of the request.

There would have been reflexive melodic syllables coming from an exclamation at the sight of some ferocious animal. In some cases, the exclamation became the word for that animal. Other melodic-syllables would have come from onomatopoeiae, such as the hissing of a snake, both as the signifier, or the shape of the snake, and signified, or the sound of the snake. There would also have been polygenetic melodic syllables such as the ubiquitous barking of a dog, so would have been cries of pain, of pleasure, of bodily functions and other sounds common to humankind generally. This is why some words are similar in all parts of the world without having a common linguistic.

We can only voice what we can hear thus melodic syllables found their sources from the soundscapes whence we dwelled.

The earliest languages developed organically and followed some form of attraction between their constitutive elements. They became agglutinated with suffixes, prefixes and infixes, appearing in good time and in good order. They built up a melodic-verbal-grammatical structure. This auditive form found its echo in parietal art and in the cave drawings at Lascaux, for instance, where I see language-art rather than art-language. A wild bull is surrounded by hunters, or worshippers. They are prefixes, suffixes and infixes: 'the man in front of the bull'; 'the man behind the bull'; 'the man on top of the bull', etc. Sometimes there is a bear, perhaps, hiding behind a rock, whose eyes and claws are just discernible in the parietal density. He is the all important observer, the narrator, therefore the verb.

Linguists mostly agree that triconsonantal forms emerged from the neolithic period onward in the Ancient Near-East and I would extend this to melodic-syllabic structures. The melodic make-up would have followed the pattern of the playing of early earth-bows as we hear them today in the Cameroon, the Congo or Mali and probably in other locations. They share the same process. They have a tonal centre when the plucked string is neither tensed nor relaxed. The higher pitches come from the musician tensing the string by lifting the top of the bow with the back of his hand, and the lower pitches, by pressing onto the top of the bow. The length of the intervals resulting from the tensing or relaxing would have varied with the emotion of the players, or with the emotion they would have wanted to express. The pitch invariability of the tonal centre remained constant and this would explain why millennia later, up to the Renaissance, theory rested on the pedestal of a tonal centre rather than from the bass or the treble.

Early music-syllables would not have progressed spontaneously by conjunct motion but rather by glissandi, that is the sliding of one pitch toward the other at variable speeds and lengths in function of the intended expression. This was reflected with the earth-bow where the two undefined pitches gravitating around the tonal centre would, most likely, also have been played portando rather than in conjunct motion.

It would seem reasonable to assume that the glissandi of sound-syllables appeared before the portandi of the earth-bow, but is it not unreasonable to think

that the portandi of the earth-bow might have influenced the glissandi of the sound-syllables, but it might be that both came as a reciprocal synchronic-melodic phenomenon - who knows?

It is only when other strings were added to the primeval bow that intervals of conjunct motion generated independent pitches as they no longer required glissandi from the tension and relaxation of the bow. It is difficult to say if the early polychordal bows, or embryonic harps, with their conjunct motion pitches influenced the separation of syllables. However, it is certain that there would have been reciprocal influences.

The analysis of Babylonian texts in this work shows that melodic thirds were the primary building blocks of music theory and were also the seminal syllabic structures. In the course of evolution, the system developed to include seven melodic thirds. They conjoined in pairs and created seven melodic fifths as exemplified in my reconstruction of the forerunner of the Neo-Babylonian text CBS 10996.

Text CBS 10996[7]

Babylonian text CBS10996 is well-known and simple. There is no need for any knowledge of Assyriology or musicology to understand its fundamentals. Simple common sense and a minimal appreciation of music will suffice although some writers have attempted at complicating matters probably '*Pour chercher midi à quatorze heures*'

It is divided in two parts each consisting of numerals and terms associated to these numerals. This does not change anything to the numeric structure which is identical in both cases.

1) Both parts have identical patterns. They consist in 14 groups of paired integers limited to the number seven, arranged as follows:

1-5; 7-5; 2-6; 1-6; 3-7; 2-7; 4-1;1-3; 5-2; 2-4; 6-3; 3-5; 7-4; 4-6

To Western Universalists these numbers spanning from 1 to 7 could only fit in with the seven pitches of the heptatonic scale, i.e., 1=c; 2=d; 3=e; 4=f; 5=g; 6= a; 7=b, and this is precisely what Professor Kilmer and her followers believed, without even thinking of any alternative possibility.

Linearity versus cyclicity

However, the postulation that the original sequence 1-5; 7-5; 2-6; 1-6; 3-7; 2-7; 4-1;1-3; 5-2; 2-4; 6-3; 3-5; 7-4; 4-6 would be a manner of arranging 1-2-3-4-5-6-7 is to be rejected for the reason that the former is a linear sequence of numbers while the latter is the consequence of a cyclical method.

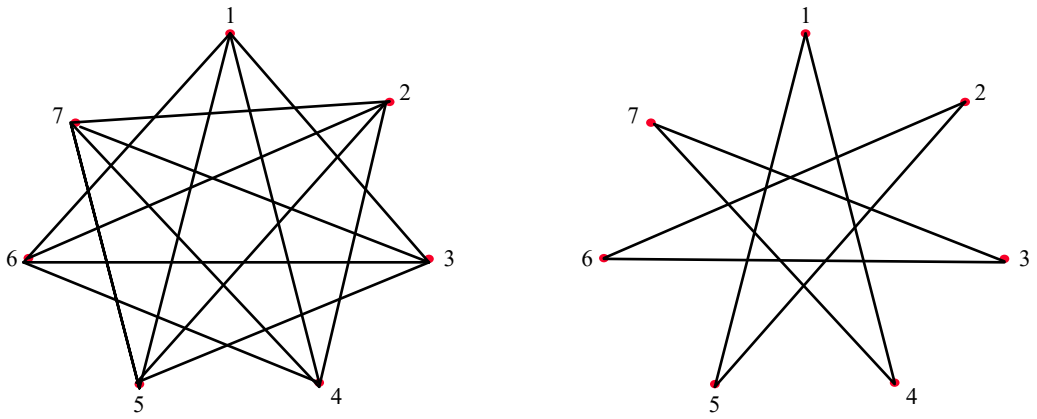


Figure 1. Two heptagrams. Left heptagram ({7}+{7/2}+{{7/3}) constructed from the linear disposition in CBS 109967; right heptagram {7/ 3} constructed from a cyclical concept in CBS 1766.

There is little doubt, comparing the two heptagrams in figure 1 above that the figure to the left was not the consequence of a cyclical concept unlike the figure to the right which exhibits an unambiguous alternation of descending fifths and ascending fourths for the purpose of tuning. It is of course possible to follow the lines in the figure to the left to end up with a heptatonic tuning. However, the lack of clarity in the process excludes it for tuning purposes.

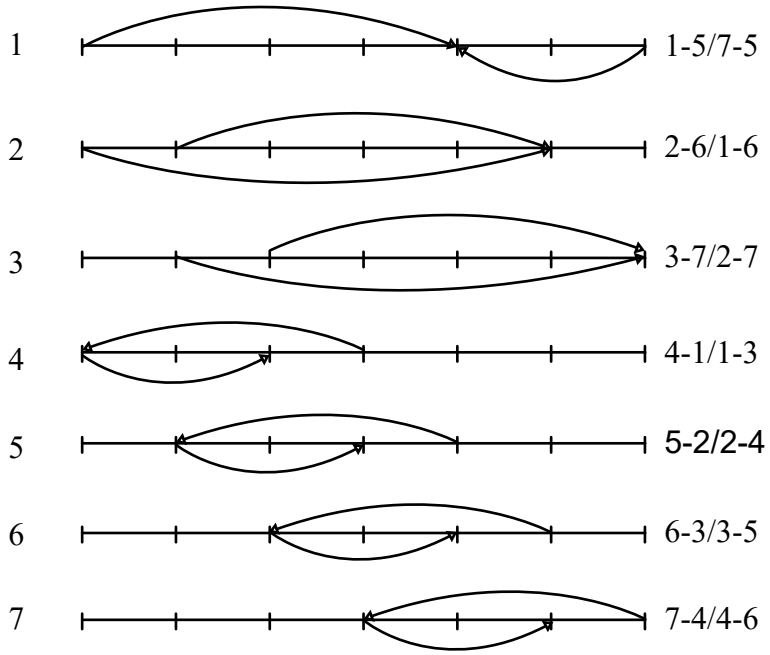


Figure 2. Linearity of CBS 10996. Note that the seven groups are independent from one another, i.e., that they have no logical (fifth or fourth) between them, meaning that one cannot tune the first pitch of a line from the last pitch of the previous line.

Relative and absolute pitches

There is no evidence in this text about the relative values of the intervals between the pitches no more than there is evidence about absolute or relative values of pitches as this text does not give any unit of measurement either for the intervals or for the pitches, other than 2-1 = 1 and that therefore the interval between 1 and 5 is 4 and of 1 and 7 is 6. Therefore, in order to describe the architecture of the text as it stands, I have temporarily ascribed an isotonic value for the intervals and pitches on my model 1 below, placed on seven interlines without any clef, in ascending and descending orders, to remain objective in their description.

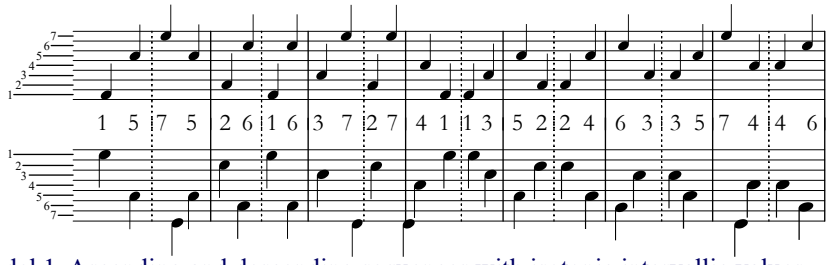


Figure 3. Model 1. Ascending and descending sequences with isotonic intervallic values.

At this point of our research we can lay down the following facts:

a) The content of the text is descriptive because it indicates a particular arrangement of seven pitches along a grid of seven degrees and that:

b) The content of the text is not prescriptive because it does not give any method by which its pitches are arranged in the position in which they are given in the original text.

Therefore, it is now appropriate to continue our investigation only with assumptions which must be analysed with the greatest objectivity.

On the basis that CBS10996 is a Middle-Eastern text and that Middle-Eastern music systems have a propensity for being systemically as well as compositionally descending, I would assume, firstly, that this text is systemically descending and secondly that its orientation towards embryonic heptatonism would also suggest some form of diatonism which is impossible to quantify from this text at present.For the sake of argumentation, I shall assume that the sequence of numbers is systemically descending and diatonic in the following manner: 1=c; 2=b; 3=a; 4=g; 5=f; 6=e; 7=d.

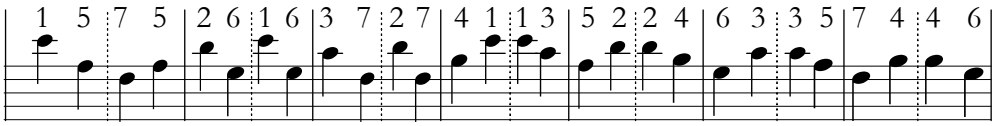


Figure 4. Model 1. Hypothetical descending sequence from hypothetical pitch value of 1 = c^6.

The absence of musicality in this sequence would suggest that the paired intervals were not intended to be played as a sequence and should be segregated from one another. My hypothesis, derived from the structure of this melodic line is that the paired intervals are of two groups. The first group (principal intervals of descending fifths) would consist of the odd and the second (secondary intervals of ascending thirds) of the even intervals, i.e. 1-7; 2-6; 3-7; 4-1; 5-2; 6-3 and 7-4, for the first group, and 7-5; 1-6; 2-7; 1-3; 2-4; 3-5 and 4-6, as seen in my models 2A and 2B, below:

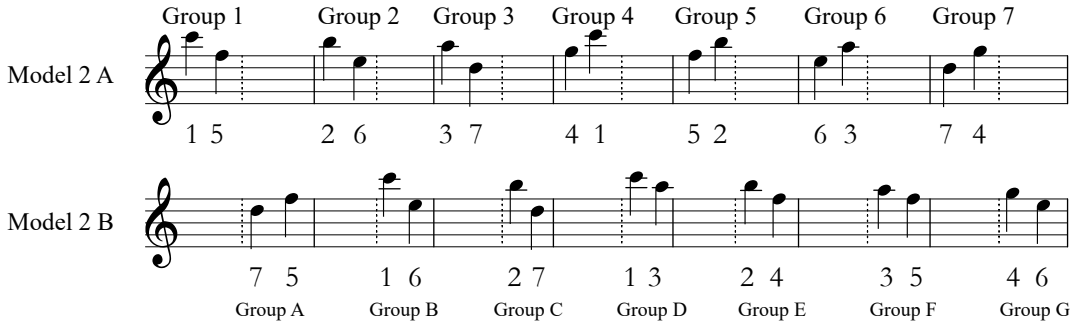


Figure 5. Models 2A and 2B, segregated into group 1 to 7 and groups A to G.

I contend that groups 5; 5; 6; and 7 should be inverted as 4-8; 5-9; 6-10 and 7-11 as shown below in model 3A:

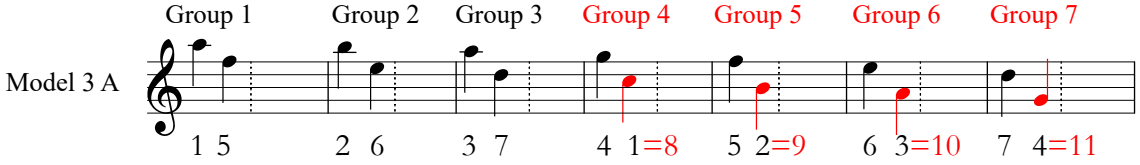


Figure 6. Models 3A, where groups 4 to 7 are inverted.

Similarly, I contend that groups B to G should also be inverted as shown below in model 3.

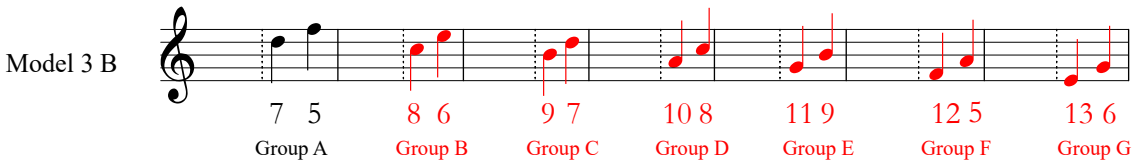


Figure 7. Models 3B, where groups B to G are inverted.

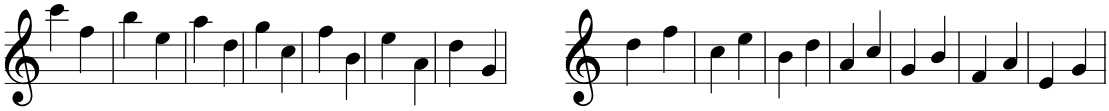


Figure 8. Models 3A and 3 B where groups 4 to 7 and B to G are inverted.

It makes little doubt that the regularity of the sequences after inversion of some of their intervals suggests that this was the original arrangement prior to their introversion within a span of seven pitches or heptachord.

See below the original pitch layout of CBS10996 and the extroversion of the original pitch layout.

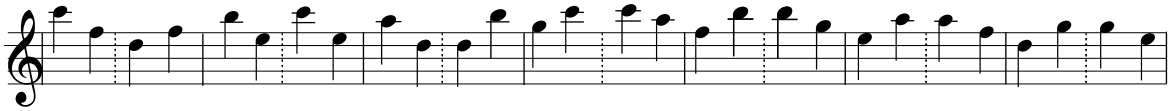



Figure 9. Original layout of the pitches in CBS10996.

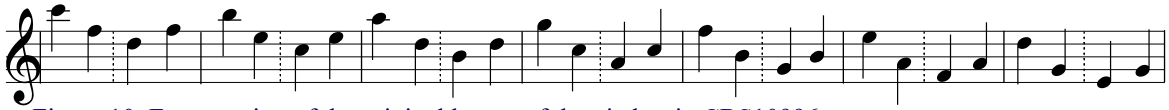



Figure 10. Extroversion of the original layout of the pitches in CBS10996.

Dating the texts

Assyriologists are unanimous about the dating of CBS 10996 to the middle of the first millennium BC. I have reconstructed a forerunner of this text which spans a layout of thirteen pitches. I have validated my hypothesis by means of proofs to raise it to the level of fact. I contend that my reconstruction probably predates the theory of the Old Babylonian period which is based on a system of nine pitches while there is iconographic evidence that instruments with larger spans tend to be more common during the third millennium.

Systemic duplicity

Thus CBS 10996 can be read in two different manners. It can be read as it is, where 71% of its intervals are introverted (inverted fifths) and therefore where 39% are fifths - which, I insist, are not extraverted fourths - and it can be read where all its intervals were initially laid out without any introversions.

I have taken these terms from psychology as I find them analogous to intervals which when inwardly inverted, especially with intervals of the fifth becoming fourths, suffer from the phenomenon of introversion as indeed an introverted fifth is inwardly turning, or focused more on its internal structure than a fifth which is seeking out external projections. Furthermore, a fourth is nothing more and nothing else than an inverted fifth since the fourth never appears in the natural harmonics in relation to the fundamental.

Span and system

Now comes the matter of the relationship between span and system. Some musicologists have argued that these parameters should not be relatable. I disagree as if musicologists specialised in ancient Greek theory are satisfied with Aristoxenos' 13-key system and the reformed 15-key system, then the hypothesis of a Greater Babylonian System of 13 pitches cannot be excluded as a forerunner of the Greek system.

It is appropriate at that point of our work to attest that heptatonism is not a system having seven pitches per octave: it is a system of seven pitches, and the same goes for pentatonism which is a system of five pitches. The complement 'per octave' is insidiously and falsely suggestive that the octave is part of heptatonism or pentatonism although there is no 'possessive' relationship between heptatonism, or pentatonism and octave. Both heptatonism and pentatonism may overflow the octave without their morphology being compromised.

The original layout of the pitches under the form in which they stand in CBS 10996 is certainly evocative of a heptatonic setup. However, it is certainly not prescriptive or systemic, as there are neither instructions about the construction of the series of intervals it includes, nor has it instructions for the construction of a heptatonic scale. This text is therefore descriptive and is the introversion of a tridecatonic prescriptive pitch series into a heptachordal ambitus.

The nature of intervals

For the benefit of some Assyriologists, I must define for them, once and for all, the nature of intervals. They appear under two forms. They are either consecutive or simultaneous. When they are consecutive, they may be of two types, either of conjunct or of disjunct motion. They are of disjunct motion when only their first and last pitches are played consecutively, i.e., 'c', then 'g'; they are of conjunct motion when all of the pitches included in-between their first and last pitches are played consecutively, i.e., 'c-d-e-f-g'.

When intervals are simultaneous, all the pitches of which they are made are sounded together as a chord, of two, three or more pitches.

Professor Kilmer and her Universalist followers have insistently dictated, that the intervals in text CBS 10996 were indubitably simultaneous, or harmonic 'dichords'. However, there is neither musicological, nor lexicological, nor iconographic proof to raise her assumption at the level of fact and that therefore her assumption must remain assumptive. However, and nevertheless, Kilmer decided to broadcast her dichordal hypothesis. This has had enormous consequences on the general understanding of the nature of Ancient Middle-Eastern music and has misled thousands of students, historians as their unproven hypothesis has been published in numerous reviews and encyclopædias.

Simultaneous intervals and polarity

Additionally to other reasons against intervals in CBS 10996 being played simultaneously comes the matter of polarity.

In the present context, polarity is which number of the pair is first listed: 1-5, in this case 1, and 7-5, in this case 7, etc.

With simultaneous intervals, it makes no difference if 1-5 is written 5-1 or 5-1, since 1 in both cases would be then bass pitch and 5, a fifth above; and the same applies to the pair 7-5 which could be written 5-7 or 7-5, without this change of polarity having any consequence on how the pair should sound. The change of polarity is the consequence of the introversion of a consecutive interval in order to make it fit, in this case into a heptachord.

So, in the sequence 1-5/7-5; 2-6/1-6, the '1'of 1-6 should become '8' in 8-6, in order to fit in with the constancy of the sequence: 1-5/7-5; 2-6/8-6, etc. Integer '8' has been inverted into '1' in order to fit within the limitation of the heptachord. Since Kilmer takes the order of polarity in which intervals are listed in CBS 10996 as an intemporal rule, and since this text was written in the middle of the first millennium BC, this would therefore apply to compositions written a thousand years earlier such as Hurrian text H6, and even to elucidate U.7/80, a text written two thousand years earlier, Kilmer's views can only be taken as absurd posterioristic hypotheses.

Had the intervals intended to be simultaneous, then there would be no reason for these changes of polarity and the sequence in CBS 10996 would have been:

1-5/5-7;2-6/1-6/3-7;2-7/1-4/1-3;2-5/2-4, etc, and not 1-5/7-5;2-6/1-6/3-7;2-7/4-1/1-3;5-2/2-4.

To conclude, why would Babylonian musicians be forbidden to play intervals other than simultaneously? The proposition is unreasonable. And when asked to give their reasons, Kilmer's followers come up with the most improbable answers, none of them scientific.

How can dichords fit in with text U.7/80?

Briefly, I would like to introduce text U.7/80 to prove how it is impossible to conciliate this text with Kilmer's hypothesis of simultaneous intervals, or dichords, in CBS 10996'. U.7/80 mentions terms which logically must be pitch sets of nine descending conjunct degrees i.e. 'c-b-a-g-f-e-d-c-b'. Kilmer, correctly, incorporated consecutive intervals of the fifth or the fourth, in the set, as prescribed. She did not place simultaneous intervals within the instructions given in text U.7/80 for the reason that they would not have made any sense in this context. Because of this impossibility, Kilmer should have admitted that her earlier hypothesis that the intervals of CBS 10996 were simultaneous was wrong and should have published an article of retraction. She did not and amazingly, applied her flawed interpretation of intervals to Hurrian text H.6. To this day, this interpretation, however wrong it may be, remains the reference.

More philology

There is little philology to help us solving lacunae in this text.The two parts run as follows:

First part: 1-5 **sa** *niš tuḫri*,

Second part: **sa** *qud-mu-ú* *ù* **sa** 5-*šú* 1-5 **sa** *niš tuḫri*

The formulation is simple.

In the first part, we have an interval qualified numerically, then the Sumerian **sa**. In Halloran's Sumerian Lexicon it is translated as 'sinew', 'tendon', 'cord', 'string', of a musical instrument'. In CBS 10996, it means 'interval', in this case *niš tuḫri*. In the second part, the line starts with **sa**. There, it means 'string'. **sa** is followed by the name of a string: *qud-mu-ú* ('prime', or 'fore-string', which I would qualify as 'tonal pitch'). In turn the name of the string is followed by the conjunction *ù* meaning 'and' which is followed by the name of another string, 5-*šú* ('fifth string', which I would qualify as 'tonal centre'). It is followed by the numbers of the interval, 1-5, followed by **sa** and followed by the name of the interval, *niš tuḫri*.

We know the names of the strings from another Neo-Babylonian text, U.3011 that we shall discuss later. There is no ambiguity about their position.

The difference between these two parts of a same text is that the first only mentions the intervals numerically followed by the name of the interval while the second part locates the interval with its string numbers and names in full. The name of the interval remains the same in both cases.

However, there must be a reason for this distinction. It is my contention that each of the two parts addresses to a different party.

The first part is essentially numeric and would be directed towards musicians knowledgeable about text CBS 1766 that we shall investigate later. It is a prescriptive heptatonic text giving tuning instructions in the form of descending fifths and ascending fourths following the cyclical structure of the heptagram.

The sequence of numbers of columns 1 and 2, expresses the alternation of descending fifths and ascending fourths. We find the same intervals in CBS 10996 but in a different order for the reason that while CBS 1766 is prescriptive and cyclical, CBS 10996 is descriptive and linear. Note that both texts could be expanded to generate a cycle of fifths but there is no

evidence for this assumption, especially that the linearity of CBS 10996 would proscribe the hypothesis. Thus the sequence in CBS 1766, 2-6-3-7-4-1-5 = 1-5-2-6-3-7-4 could be quantified as a cycle of fifths as: 1-5-9-13-17-21-25-29-33, etc.

The reason for the second part of CBS 10996 seems to be addressed to illiterate musicians who still see their strings listed as in U.3011, that is as a symmetric linear enneatonic system, probably for lyre players although now, with CBS 10996, in a heptatonic ambitus.

Allocation of relative pitches

The assignment of relative pitches to texts CBS 10996 and 1766 is now possible should we agree that the system issuing from CBS 1766 is diatonic. Then it is possible to ascribe a Western equivalence to each pitch, warning the reader that it is only used for illustrative purposes. I have arbitrarily chosen C for 1, therefore b=2; a=4; g=4; f=5; e=6 and d=7. This is to avoid the presence of accidentals in the demonstration.

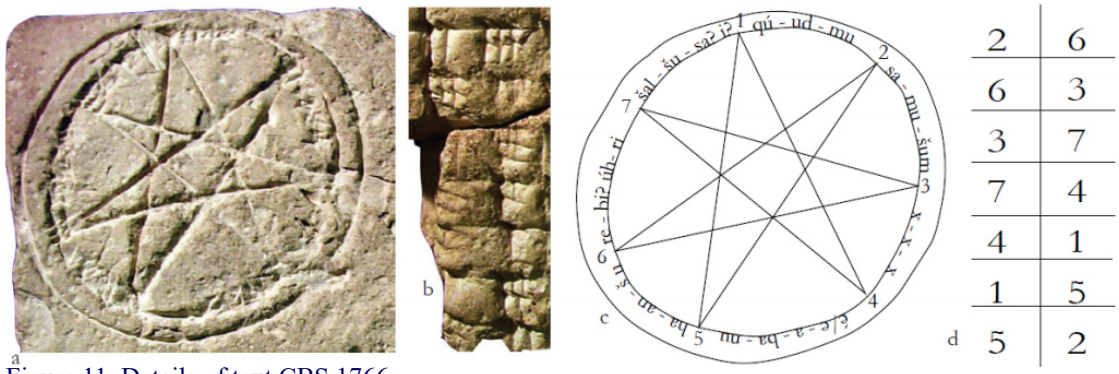


Figure 11. Details of text CBS 1766.

Enneatonic pitch set construction from U.3011

I shall come back to text U.3011 later in this work. At present, I will succinctly describe my hypothesis for its quantification. As I have shown above, the strings are listed in a palindromic/symmetric order. My contention is that the tuning started from the central pitch, the tonal centre. This operation consists of five steps. Firstly, projection of two fifths from the tonal centre 5; secondly, projection of two fourths from the boundaries of the span, ‘a’ and ‘g’; thirdly projection of two fourths from the tonal centre ‘d’; fourthly projections of two fourths both from the third degree on each side, ‘f’ and ‘b’.

Line	Column i		Column ii	
	Sumerian	**Translation**	**Akkadian**	**Translation**
1	**sa-di**	string **DI** prime (?)	*qud-mu-* ⌜*um*⌝	prime(?) (string)
2	**sa-ús**	string neighbouring	*šá-mu-šu-um*	neighbouring (string)
3	**sa-3-sa-sig**	string 3 string thin	*šá-al-šu qa-a[t-nu]*	third (string) thin
4	**sa-4-tur**	string 4 small	**A-[DÙ]**	Ea-banû Ea-the creator
5	**sa-di-***5	string **DI** prime (5)	*ḫa-am-[šu]*	prime(?) (fifth string)
6	**sa-4-a-ga-gul**	string 4 rear	*ri-bi úḫ-ri-i[m]*	fourth of the rear (string)
7	**sa-3-a-ga-gul**	string 3 rear	*šal-ši úḫ-ri-im*	third of the rear (string)
8	⌜**sa-2-a-ga**⌝**-gul**	string 2 rear	*ši-ni úḫ-ri-im*	second of the rear (string)
9	[**sa-1**]⌜**a**⌝**-ga-gul-la**	string 1 rear	*úḫ-ru-um*	rear (string)
10	[**9**]⌜**sa**⌝**-a**	9 strings	9 *pi-it-nu*	9 strings

Figure 12. U.3011, transliteration and translation.

Figure 12 above shows my construction hypothesis extrapolated from text U.3011. It generates a ditonic diatonic enneatonic descending set from 'a6' to 'g4'. Note that the central interval between f5 and b5 is not a quite a tritone (1024/729= 588.27 cents). The Pythagorean tritone is 729/512 = 612 cents. The closest match for 1024/729 would be 45/32 = 590 cents, a false pluperfect fourth. This explains why the Greeks separated the two fourths of their heptatonic set by a tone of disjunction of 9/8 in order to correct the tritonic value. Therefore the ditonic diatonic descending enneatonic pitch set in U.3011 is, in musical cents: 0 - 204 - 408 - 498 - 702 - 906- 996 - 1200 - 1404.

However, as we shall see later, this basic tonal quantification probably dating from the third millennium BC will be subject, in the course of time, to modal variations indicated by differences in the philology that we shall analyse later, and by the names of the intervals as they figure in CBS 10996.

Tridecachord or heptachord

Was the ambitus tridecachordal or heptachordal? That is the question. The answer is straightforward. The tridecachord has an ambitus of 13 pitches, and the heptachord hosts a heptatonic system. Thus both term, tridecachordal and heptachordal/heptatonic, in the present case are not comparable. The heptatonic system can start from any pitch in the tridecachordal span.

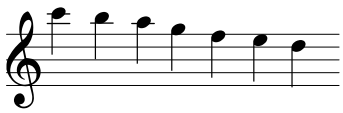



Figure 13. Transposition of the relative pitches issuing from the method in CBS1766 in Western notation.

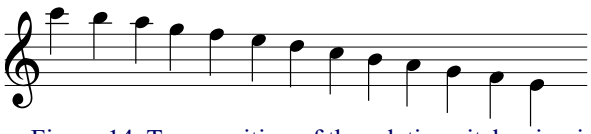



Figure 14. Transposition of the relative pitches issuing from the reconstruction of the forerunner of CBS 10996 in Western notation.

Therefore, the intervals in CBS 10996 are just a demonstration of how by means of introversion they can be made to fit a heptachordal ambitus. However, there is no reason why the heptatonic system should be restricted to the ambitus of the heptachord. It may overflow the systemic sphere to satisfy the demands of composition while remaining systemically heptatonic.

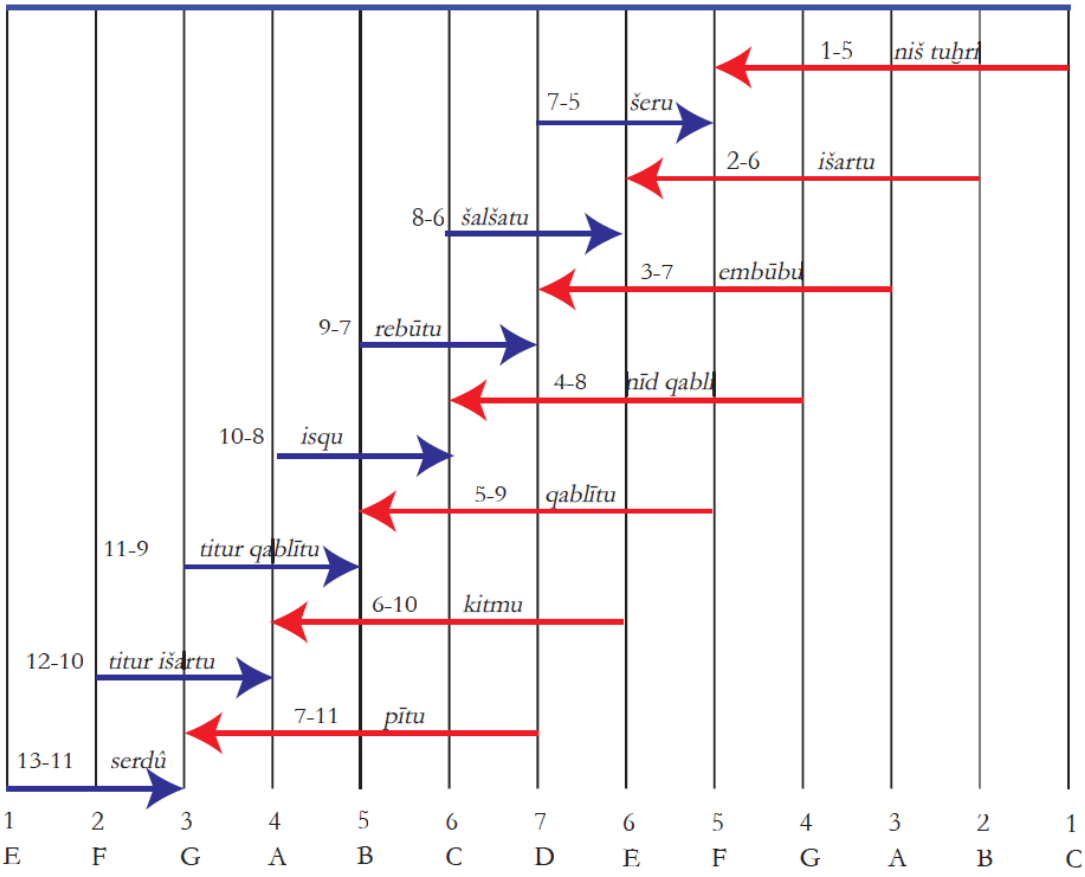


Figure 15. Primary consecutive intervals of ascending thirds in blue and secondary consecutive intervals of descending fifths in blue.

The nature of the intervals of the tridecachord

As I have shown, the intervals are of two types, ascending consecutive thirds or primary intervals and descending consecutive fifths or secondary intervals. Each of these intervals has a name which indicates that they are different from one another; and how would they be different from each other if they consisted only of their first and last pitches? This is therefore proof that they were intervals of consecutive motions, i.e. G-f-e-d-C.

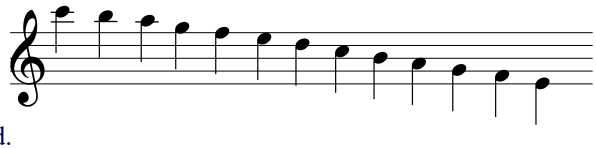



Figure 16. Tridecachord.

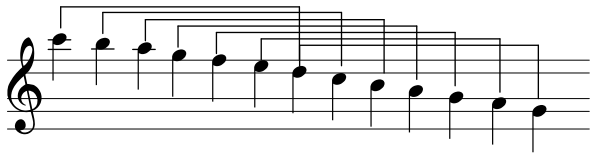


Figure 17. Seven heptatonic pitch-sets laid onto the tridecachord span.

Provisional analysis of the interval terms in CBS 10996

We have already mentioned that most meanings of intervals names in CBS10996 are obscure. However, '*qablītum*' (written '**SA MURUB$_4$-tu**') is unequivocal. It means 'middle-part', or 'inner-part'. As we shall see later, this term is logically appropriate as it places this interval right in the middle of the system. The term '*tuḫri*.' In lines 1 and 15 is found in the CAD under '*šaḫūru*' B ('*šuḫāru*', '*šuḫru*', '*suḫru*', '*zuḫru*', '*tuḫru*' and '*šiḫru*'), and is defined as 'a part of the foot'. '*šēru*', entry B, is defined as 'song'. The word is found at Mari, Ras Shamra, in Standard and Neo-Babylonian. '*išartu*' suggests 'straight', 'normal'. Adjective '*šalšatu*', under '*šalšu*', along with '*šaššu*' (feminine '*šalištu*'), '*šaluštu*', '*šalultu*', '*šalussu*', '*šaššatu*', means 'third'. The term '*šalšu*' is known from U.3011, line 3, Akkadian column. The next term, '*embūbu*', also '*enbūbu*', *ebūbu*' is said to mean 'flute' in the CAD which is an unsatisfactory translation. The generic term 'pipe(s)' would be more appropriate as it defines all 'pipe-like'-instruments, of which flutes are part. Text KAR158 (a catalogue of songs), reverse i 47 has Sumerian '24 **GABA.MEŠ**', Akkadian '*ša eb-bu-be*', translating as '24 breast-songs to the (type of pipe)'; '*ši-iṭ-ru ša eb-bu-be* ^{URI}**ki**' meaning '13 . . . . to the flute,

Akkadian'. '4-**tu** = *rebūtu*'. It is known from U.3011 as '*ribi uḫrim*', line 6.

Some suggest that Sumerian '**šub.murub** = *nīd qabli*', means 'fall of the middle'(?). Sumerian '**giš.šub.ba** = Akkadian '*isqu*' is translated it as 'lot/portion'(?). Sumerian '**murub$_4$.tu**' = '*qablītu*', means 'part of the middle', unequivocally. '*titur* **murub$_4$.tu**' = '*titur qablītu*','bridge of the middle'(?)'*kitmu*' would mean'closing'. '*titur išartu*' would be the 'bridge of the middle'. '*pitu*' means 'opening'. This term is the second which makes sense in this list as the word also names a pitch set, which, as demonstrated with U.3011, is the generative pitch set of the system, or the 'opening' scale: a-g-f-e-d-c-b-a-g, or g-a-b-c-d-e-f-g-a. '*zirdu*', may be translated as 'lament'. Only translations of '*qablītu*' and perhaps '*pitu*' may be coherent with musicology.

What was the purpose of text CBS 10996?

In its introverted form, that is in its present arrangement, CBS 10996 was nothing more than a scholarly exercise in the transposition of the tridecatonic original system onto a heptachord. Hence the many introversions to which this arrangement was subjected. By the mid-first millennium BC, the new heptatonic system would have transformed radically the manner in which music was notated. It is possible that pitches within the heptatonic framework became known as numbers, i.e., pitch 1 = b; pitch 2 = a; pitch 3 = g; pitch 4 = f; pitch 5 = e; pitch 6 = d and pitch 7 = c, in addition to primary (↑3-pitch-sets) and secondary (↓5-pitch-sets) sets as they were known in the tridecatonic arrangement. Both notations are not mutually exclusive. The older primary and secondary melodic intervals would have overflown the heptatonic span which while systemically limited to its seven degrees would have freely expanded to whatever ambitus it had wished, as already mentioned. This is another argument against dichords showing that Kilmer confused system with ambitus, as if music is duteous to the pattern of its system, it is not limited by ambitus as the system may be duplicated while adhering to its system.

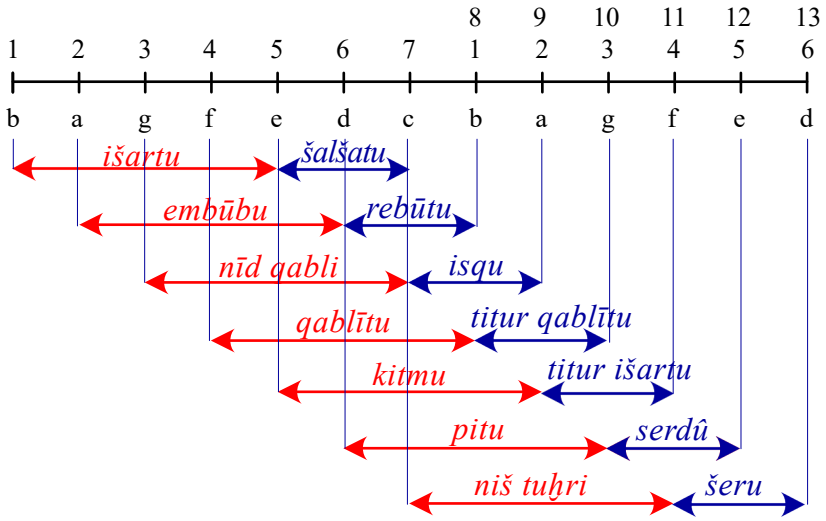


Figure 18. Linear representation of the seven degrees of the heptachord in CBS 1766 in relation to the tridecachord extrapolated from CBS 10996 showing the compatibility between both systems, the numeral and the intervallic. Primary intervals in blue and secondary intervals in red.

The original text which I have reconstructed by extrapolation and for which the archaeology has not yet excavated any copies, would have listed the fundamental primary and secondary intervals which amounted to the fundamental ambitus. The particular arrangement of these intervals puzzled me for some time as it makes no doubt that there must be a reason for it. Babylonians never did anything gratuitously.

It is my contention that the names of Babylonian intervals were fragments of incipits in the same way Arabian *ajnas* (plural, singular *jins*) are groups of three, four of five consecutive pitches which are often known from their toponymic or other, incipits.

Two *ajnas* combine into a *maqam* (plural *maqamat*) in the same way Babylonian intervals combined into larger pitch-sets. This concept is also practised in Iran and in Turkey and in Mizrahi and Sephardic Middle-Eastern Jewish prayers. Every Shabbat the congregation conducts services using a different maqam. Thus this formulation is common to the modern Middle-East as it would have been in the Ancient Middle-East.

However, the word '*maqam*' only appears in the fourteenth century treatises of al-Sheikh al-Safadi and Abdulqadir al-Maraghi, while the terms *jins* and *ajnas* remain elusive but were most probably used in the traditions of folk culture since Sumerian and Babylonian times, up to five thousand years ago.

Early Islamic theoreticians preferred the Greek equivalent of *jins*, the *genos*, which was widely and variously used in Greek: (γένος, species, sort, category, etc., plural γένη *genē*). The word stems from Proto-Hellenic **génos*, from Proto-Indo-European *ǵénhɪos 'race'. Cognates include Latin *gens*, Latin genus, Sanskrit *jánas*, Old Armenian ծին '*cin*' and English '*kin*'. Mesopotamian lexicology has provided us with the Sumerian term '**sa**' which has no homophonic relationship with the aforementioned languages. It is possible that they preferred the Sumerogram '**sa**' and never found the need for a Semitic replacement.

Ajnas would have been incipits or fragments of incipits of melodies easily recognisable from their first pitches. For instance, the primary interval *išartu* would have been the incipit of a song, or of a hymn or of any other melody which started with the pitches b-a-g-f-e and so forth, for each of the primary and secondary intervals. This was a very ingenuous mnemotechnic system as the name of the incipit would immediately evoke the nature of the interval mentioned. Say *bayati* to a '*ud* player, he knows immediately the whole pattern of the *maqam* of the same name.

The particular arrangement of the melodic intervals in my reconstruction of a hypothetical precursor to CBS 10996, unknown to any other culture may find its explanation with parallels in ethnomusicology, the purpose of incipits and of their intonations.

To launch the premise, I shall introduce the concept of tonal memory. It is impossible to say if musicians, four thousand years ago or so, were gifted with absolute pitch, and why should they? If they depended on string instruments, then they would have been faced with an aleatory tuning of the harp or of the lyre for the reason that most probably there were no standard measurements for them. This is reflected in the iconography which has not produced lyre or harp ensembles until the middle of the first millennium BC. This would not have applied for the *pitnu*, or the *inu*, the long-necked lute, as this instruments had not yet reached its classical status during the Old-Babylonian period and was probably conceived to produce a rhythmical background to the lewd acrobatics of the performers, it is believed. Such a scene is depicted on a plaque which was moulded in Babylonia some four thousand years ago.

It would have been more reasonable to use pipe instrument since the pitches on this type are fixed and therefore reliable. However, there is no evidence that all pipes were tuned to the same pitch. Therefore the concept of a universal pitch is a proposition which is difficult to sustain unless in the context of a restricted group of musicians where instruments, eventually, would have self-synchronised, in the course of time, between themselves and with the voice.

Instruments are extensions of the voice and that therefore, primarily, it would have been for instruments to set their pitches within the melodic sphere of the voice and not the contrary, at least initially, and of course, where instruments accompanied the voice were not soloists. The voice is the initial sound-producer which dictates its ambitus and its tonal structure to all other instruments. The voice is the most portable of all instruments from which all others developed. Therefore, it is the voice from which blossomed the first melodies. These seminal pieces gravitated around a tonal centre from which started and perhaps ended the melody and would have consisted of three pitches, initially. This is why throughout musical history, the tonal centre would be the centre of the set or its beginning, at the treble or at the bass, and so the only certainty in this matter is that nothing, for sure, is certain. However, we have evidence from earth-bows found mostly in central Africa, where a shallow hole is dug near a sapling tree with an animal hide stretched over it. Some sinew, or a strip of hide pulled-out from it is connected to the top of the branch. When the sinew is plucked under the sapling's natural tension, it gives the tonal centre. Pressing on the top of the sapling bow and plucking the sinew gives the lower pitch and lifting it with the back of the hand tenses the sinew and produces the treble pitch as shown below.

The music played on this earthbow is, let us say 'A' as tonal centre with 'B' and 'G' as complementary satellite tones to the treble and to the bass. However, these intervals may vary depending on the intention of the musician and also depend on the quality of the instrument. This is unimportant as the major function of this instruments is that as a simple variable tritonal system, it can generate a quantity of melodies of significant emotional value.

Figure 19. Baka Pygmy playing the anghbindi, or earth-bow. Filmed in the Cameroon near the Congo border. Filmed in 1998.

Tonal memory is better imprinted in the unconscious when it is supported by a text under the form of incipits. The earliest forms of incipits come from Sumerian archival tablets and although these were not essentially designed for the purpose of music, it is certain that music too used the principle as late as during the first millennium BC. There is a notable example with text YBC 11381 where each of the nine strings/pitches have the following musical/textual incipits: String 1: May Aššur, the king of the gods, improve your dominion for you; String 2: May Ištar, who created mankind, grant you well-being and longevity; String 3: May Daragal make you rival the fierce weapon (s and) the raging storm; String 4: Enkidu, treat kindly the Lady, the protective spirit who created good things, the lamassu; String 5: May Damkianna make your appeal, your prayers, and the stroke of your nose always pleasing to the lord of lords; String 6: May Endašurimma present your artful advice and you precious words daily; String 7: May Endukuga always let your footstep fall on a prosperous road ans a smooth path; String 8: May Enudtila constantly establish abundance, plenty, and prosperity for the pastures of your people; String 9: May Enmešarra crush the forces of those who wrong you and of your enemies. May he scatter the weapons of your adversaries. Thus the music of the Ancient Near-East would have used musical/textual incipits, for about 3000 years.

I would like to introduce a more recent example of the modern usage of incipits. Among my doctoral students some years ago were violinists and pianists. It is well-known that pianists have the reputation of having a ‘bad-ear’, some of them unable to distinguish a fifth from a fourth. In order to bring remedy to this deficiency, I used incipits such as ‘Twinkle twinkle’ to remind them of a fifth and ‘Allons enfants’, the two first word/pitches of the Marseillaise

for the fourth. This is a good example of how incipits help remind of intonation. Now, the seven names of primary intervals and the seven names of secondary intervals of the extroverted version of CBS 10996 are incipits, I contend. They helped the singers and instrumentalists remember the nature of the intervals. Each primary interval is a third and each secondary interval is a fifth. They all differ from one another. This is why, precisely, that in addition to their location by means of numbers, their melodic names, which were unconsciously memorised, reminded the musicians of the melody of the incipit and therefore of the quality of the intervals. However with the ditonic system there would be similar intervals of the fifth: c-d-e-f-g = g-a-g-c-d = T:T:T:1/2; d-e-f-g-a = a-b-c-d-e = T:1/2:T:T. This is further evidence that the system was diatonic and not ditonic.

The function of thirds in my extroversion of the intervals of CBS 10996 has already been discussed by Curt Sachs in his 'The Wellsprings of Music' where he reports that according to K.P. Wachsmann, of the Uganda Museum in Kampala, some harps were not tuned conventionally, that is by alternation of descending fifths and ascending fourths, or reciprocally, but by descending chains of thirds. I believe that Babylonians used a similar method which I will now propose as a reasonable hypothesis.

We have seen that in my extroversion of the intervals of CBS 10996, there are seven consecutive ascending thirds alternating with seven ascending consecutive fifths.

As I have mentioned before, I believe that each of the names of the ascending consecutive thirds and each of the names of the descending consecutive fifths were incipits, or abbreviated incipits. This is possibly why we cannot give them a meaning since they would be only fragments of incipits. However, and only for the purpose of demonstration, one incipit-interval, *pītu* which can be translated as 'opening', 'opening ritual', 'opening ceremony' would have had a relation with the following *pīt upnī*-prayer: *pi-ti upnīšu la išammeušu meaning* '(the gods) will not heed his prayer'. Should this be the case, which is highly improbable, then *pi-ti upnīšu* would be sung to d-c-b-a-g.

Now pitch memory is not as unusual as it seems. In piano factories, as soon as pianos are strung, laying flat on their backs for upright pianos or on their legs

for grand pianos, the process begins. The ‘chipper’ starts from an ‘a’ for which he uses a tuning fork. The other strings are chipped by tonal memory throughout the range of the piano, chromatically. Of course more than one chipping is needed until the piano strings are stabilised but by the time a good chipper finishes his work, the tuning is fairly acceptable despite of the refinements of the equal temperament tuning. This means that our unconscious is able to guide our auditory sense to the tuning of a sophisticated system that we may loose should we replace it with a ‘synthetic system’ or a tuning system which was taught to us in tuning schools. My own experience in piano tuning is that after the instrument was tuned ‘academically’ I used to make corrections which excluded any usage of ‘technique’ but which relied only on my musical appreciation. I take advantage of this work to inform the reader that electronic piano tuning devices are to be excluded from tuning any instrument for the reason that it compares a given pitch played on an instrument to the exact pitch on a tuning device and then allows the user to correct the pitch of the instrument to the pitch of the device. The correction of a pitch to the pitch of a device is always inaccurate. Only comparison of intervals can lead to a correct tuning. See https://en.wikipedia.org/wiki/Electronic_tuner

Memory tuning

The tuning starts with the lowest ascending third. The ambitus of the instruments is irrelevant, unless is is fitted with less than six strings although tuning three strings with a three-tone incipit would be acceptable as we shall see. With the extraversion of text CBS 10996 the first third is e-f-g, (semi-tone-tone). (Let us take for example the incipit: ‘If I were’ , from ‘If I were a rich man’ from ‘the Fiddler on the Roof’). This is followed by f-g-a, having two pitches in common with the first third: f-g. The incipit for the next third could be f-g-a as in whatever melody, and so forth until the treble most of the instrument was tuned and then descending fifths would be played, to their own incipits which would have to match the thirds previously tuned. If there were mismatches, they would be corrected until the instrumentalist was happy with his tuning, that is when all the incipits pitches matched one another. Now, depending on the ambitus of the instrument and depending on the pitch set of

the music which was to be played, it is obvious that musicians knew with which ascending third to start their tuning sequence. Of course, the nature of the intervals would not have been of equal temperament but were tuned to the tuning system which was used at that time. Therefore, my conclusion is that before the middle of the first millennium BC, it was memory tuning that was used and that it is most likely that it would have been a tuning in just intonation. It is thus further demonstrated that Kilmer's dichords as seminal, intemporal and ubiquitous principle is flawed. The tuning system in CBS 1766 marks the end of the memory tuning system which is particularly well demonstrated with text *nabnītu* xxxii and the extraversion of CBS 10996, and with the advent of a constructed heptatonic system as illustrated with CBS 1766. This further proves that the introverted intervals in text CBS 10996 were simple exercises in adapting tridecatonism into a heptachordal span.

Some would say that my extraversion of CBS 10996 proves that heptatonism dated from the Early Bronze Age to which I will answer that it does not because the structure of extraverted CBS 10996 rests on an all together different concept for which *nabnītu* xxxii is the paradigm, as I shall explain later. Essentially, *nabnītu* xxxii was a linear symmetric enneatonic system from 2600BC to about 2000 BC where it would have been tuned in just intonation, and CBS 1766 was a cyclical asymmetric heptatonic system from 600 BC to the advent of the equal temperament in the late 17th century AD.

I contend that the primary and secondary intervals were tuned in just intonation for the reason that two different tones and two different semitones were needed in order to distinguish all primary and secondary intervals from one another.

1		[1 5			**sa**			*niš tuḫri*]*
2		[7 5			**sa**			*še-e-ru*]
3		[2 6			**sa**			*i-šar-tu*$_4$]
4		[1 6			**sa**			*šal-šá-tu*$_4$]
5		[3 7			**sa**			*em-bu-bu*]
6		[2 7			**sa**			*4-tu*]
7		[4 1			**sa**			**šub.murub**$_4$]
8		[1 3			**sa**			**giš.sub.ba**]
9		[5 2			**sa**			**murub**$_4$-*tu*$_4$]
10		2 4			[**sa**			*ti-tur*] **murub**$_4$-*tu*$_4$
11		6 3			**sa**			*kit-mu*
12		3 5!			**sa**			*ti-tur i-šar-tu*$_4$
13		7 4			**sa**			*pi-tu*$_4$
14		4 6			**sa**			*zer-du*
15	**sa**	*qud-mu-ú*	*ù*	**sa**	5-*šú*	1 5	**sa**	*niš tuḫ-ri*
16	**sa**	3! *uḫ-ri*	*ù*	**sa**	5-*šú*	7 5	**sa**	*še-e-ru*
17	**sa**	sa-ge$_6$	*ù*	**sa**	4 *uḫ-ri*	2 6	**sa**	*i-šar-tu*$_4$
18	**sa**	*qud-mu-ú*	*ù*	**sa**	4 *uḫ-ri*	1 6	**sa**	*šal-ša-tu*$_4$
19	**sa**	3-*šú-sig*	*ù*	**sa**	3-*šú uḫ-ri*	3 7!	**sa**	*em-bu-bu*
20	**sa**	**šá- ge**6	*ù*	**sa**	3-*šú uḫ-ri*	2 7!	**sa**	*4-tu*
21	**sa**	^{d}**e.a.dù**	*ù*	**sa**	*qud-mu-ú*	4 1	**sa**	**šub.murub**$_4$
22	**sa**	*qud-mu-ú*	*ù*	**sa**	3-*šú* **sig**	1 3	**sa**	**giš.šub.ba**
23	**sa**	5-*šu*	*ù*	**sa**	**šá-ge**$_6$	5 2	**sa**	**murub**$_4$-**tu**
24	**sa**	**šá- ge**$_6$	*ù*	**sa**	^{d}**ea.dù**	2 4	**sa**	*ti-tur* **murub**$_4$-**tu**
25	**sa**	4 *uḫ-ri*	*ù*	**sa**	3-*šú* **sig**	6 3	**sa**	*kit-mu*
26	**sa**	3-*šu* **sig**	*ù*	**sa**	5-*šú*	[3 5	**sa**	*ti-tur i-sar-tu*$_4$]
27	**sa**	3-*šú uḫ-ri*	*ù*	**sa**	[^{d}**é-a-du**	7 4	**sa**	*pi-tu*$_4$]
28	**sa**	^{d}**é.a.dù**	*ù*	**sa**	4 *uḫ-ri*	4 6	**sa**	*zir-du*]

Figure 20. CBS 10996, transliteration and translation.

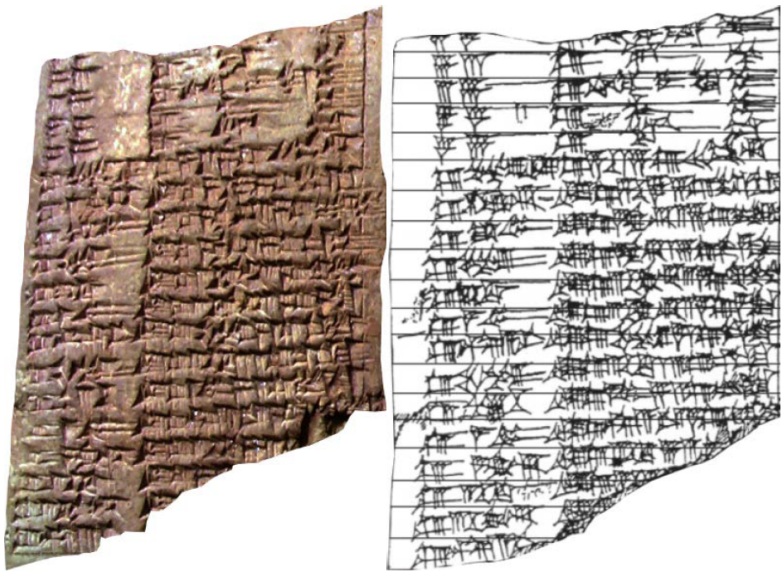


Figure 21. CBS 10996, left column and hand copy.

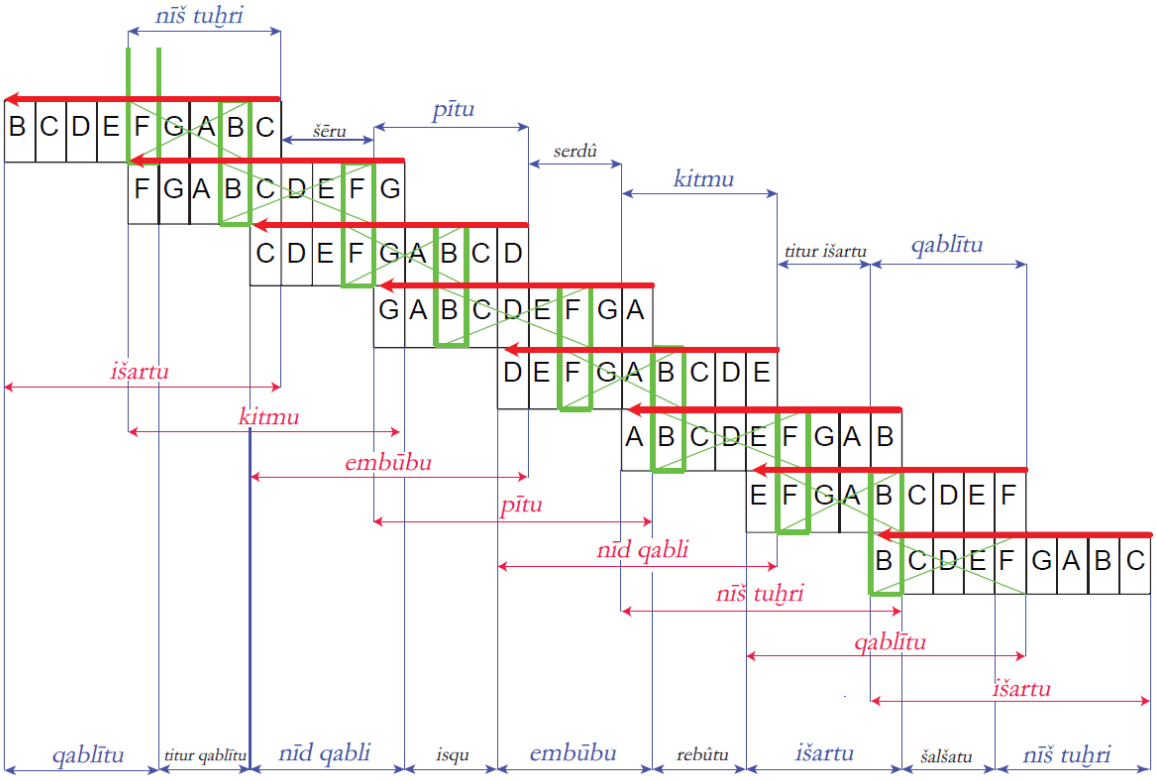


Figure 22. Complete graphic illustrating the formation of fifths from conjoined thirds, the formation of enneatonic pitch-sets from conjoined fifths. The heptatonic pitch-sets can be located within the enneatonic sets, as there are three possible positions for each heptatonic set per enneatonic set.

Conclusions

a) Text CBS 10996 and its contents dates from the middle of the first millennium BC.

b) It is a descriptive text showing a list of fourteen intervals, both positioned and named.

c) The text is composed of two parts addressed to different levels of musicological understanding.

d) It is the introversion of an older tridecachordal system into a heptachordal ambitus.

e) It is not a prescriptive text for the reason that it does not give any instructions to build anything from it.

f) The intervals listed may be interpreted either consecutively or simultaneously, but not exclusively simultaneously.

g) The dating of CBS 10996 means that the position and quality of its intervals may not be used posterioristically for the interpretation of any older texts such as the Hurrian song H6 by which it is separated by about a thousand years, and for the interpretation of U.7/80 by which it is separated by about two thousand years since for the two last mentioned texts, the intervallic layout differs.

h) Heptatonism is not limited by the boundary of the heptachord. Heptatonism can be extended to the treble or to the base by as many pitches it wishes in order to allow compositions to express their inspirations without any span limitations. Scholars who have taken the intervals as given in CBS 10996 as the only tools given to the composer are absurdly mistaken. The consequence of this is their poor rendition of Hurrian text H6.

Text CBS 1766

Figure 23. CBS 1766, courtesy of the University Museum of Philadelphia, Pennsylvania.

This tablet is kept in the collections of the University Museum, Philadelphia, Pennsylvania. It is part of a collection of 154 items including 126 cylinder seals, 13 tablets, 8 stamp seals, 2 tablet fragments, 1 brick, 1 brick fragment, 1 brick stamp, 1 bulla, 1 cylinder fragment and 1 sealing, all acquired by R.F. Harper, on behalf of the Penn Museum, from Khabaza a Jewish dealer from Baghdad, in 1889.

The manuscript dates from the Neo-Babylonian Period historically known as the Chaldean Empire (626 -539 BC). Therefore, it is without doubt a document dating from the middle of the first millennium BC and certainly not before. However, certain authors, dated this text in their publications to a much older period in order to insinuate that the heptatonic system had been known during the Kassite Period, running it concurrently to Old-Babylonian treatise U.7/80, that I shall discuss later. The reason for this falsification is that having wrongly

and intentionally dated heptatonism to the Old-Babylonian Period (2000-1600), their dating of CBS 1766 to the Kassite Period Period (1600-1200) would somehow blur their deception as both periods very slightly overlap, and that this fudging would therefore not appear to be too obvious.

However, any attempt at falsifying the evidence to satisfy one's ends is disgraceful, especially in an academic context and should be vociferously condemned.

The tablet is 13 centimetres by 9 centimetres and 3 centimetres thick. It was initially wrongly catalogued by Hilprecht and then by Horowitz as 'astronomical', and was said to have been excavated at Nippur, which is probably correct.

It was first published by Hilprecht over one hundred years ago in his Explorations in Bible Lands During the 19th century. The volume includes a photograph with a caption describing the manuscript as an 'Astronomical Tablet from the Temple Library of Nippur'.

Then, in 2007, Caroline Waerzeggers and Ronny Siebes from the Vrije Universiteit in Amsterdam published a revised edition of most of the text, especially with regard the nomenclature inscribed onto the heptagon which they identified as the well-known terms for the musical strings/pitches that were first learnt from text U.3011. However, while there were initially nine strings/pitches, CBS 1766 only mentions seven of them, dropping off the two last strings, namely *ši-ni úḫ-ri-im* and *úḫ-ru-um*, ('second of the rear' and 'rear string').

This is fundamentally important as it marks the transition from enneatonism to heptatonism and from enneachord to heptachord.

The tablet is divided in two sections, one graphic and one tabular. The first section, at the top left consists of a {7/3} heptagram inscribed within two concentric circles with the seven names of the first seven strings of the enneachord known from U.3011, written on the inner side of the circles and adjacent to each of the seven points of the heptagram.

The second section, below the heptagram, is a table with 11 columns. Columns one and two are inscribed with two lists of seven numbers each. These columns are essential to the principal understanding of the text. A header spreads along the whole length of the columns. Some attempts at its translations

have been put forward but none up to now is sufficiently meaningful. Column 11 has traces of terms which remain obscure. We take it that there is a relationship between the inscribed heptagram and the content of the columns.

The nomenclature on the heptagram and the readings of the first two columns to the left of the table are unequivocal.

The numbers in the columns suggest an alternation of descending fifths and ascending fourths. Should '1' be 'C', then '2-6' = 'B-E'; then '6-3' = 'E-A'; '3-7'= 'AD'; '7-4' = 'D-G'; '4-1' = 'G-C'; '1-5' = 'C-F' and '5-2' = 'F-B'.

To a musicologist, this pattern suggests a typical method of tuning still in usage to this day. It gives the construction method of a descending diatonic ditonic heptatonic scale by means of descending fifths and ascending fourths, which produces a descending heptatonic system. I have chosen to illustrate the pattern diatonically starting with the descending fifth 'B-E' followed by the ascending fourth 'E-A', etc., because this way, the last alternation will fall on a dissonance avoiding any accidentals, for the sake of clarity, and that we are only interested, presently, with relative pitching.

The heptagram associates the points of the star with the names of the strings from one to seven. It is to be noted that although the strings have been reduced to seven while they amounted to nine in Old-Babylonian treatises and even in some later texts, where they kept the older nomenclature, i.e., 'front (string)'; 'neighbouring (string)'; 'third thin (string)' 'Ea-the-creator' (string); 'fourth-behind' (string) and 'third-behind' (string). It makes no doubt that while the heptagram was a systemic revolution, it nevertheless kept elements of a former theory.

First conclusion

Although the text is incomplete, its readable parts are sufficiently explicit as the indubitable proof that a diatonic, ditonic heptatonic system existed in the middle of the First Millennium BC, and certainly not before.

This manuscript is prescriptive as it gives the method for the construction of a fundamental heptachord and its complementary six sets which derive from it. They assemble in what is known as a system as each of the seven sets starts with each of the seven pitches in their original order.

Heptatonic construction

An interesting point in this construction is that the paired numbers in columns 1 and 2 which indicate four descending fifths (2-6); (3-7); (4-1 = 4-8); (5-2 = 5-9) and three ascending fourths (6-3); (7-4); (1-5 = 8-5), no longer gives them as linear expressions.

With CBS 1766, the linear disposition has been converted as the encircled 14 straight strokes of a {7/3} heptagram. It is difficult to understand the reasoning behind the conversion of the enneatonic system described/suggested in U.3011 and prescribed in U.7/80, where the intervals came to change from being linear to being inscribed within an encircled heptagram. In this construction, it is the seven points made by the junction of the 14 straight strokes signified by intervals of fifths and fourths which punctuate the heptatonic system on the circumference. It is now conclusively proven that the Babylonian heptatonic system is beyond any reasonable doubt melodic and not harmonic. However, the points of the heptagram are still equidistant and do not take account of tones and semitones.

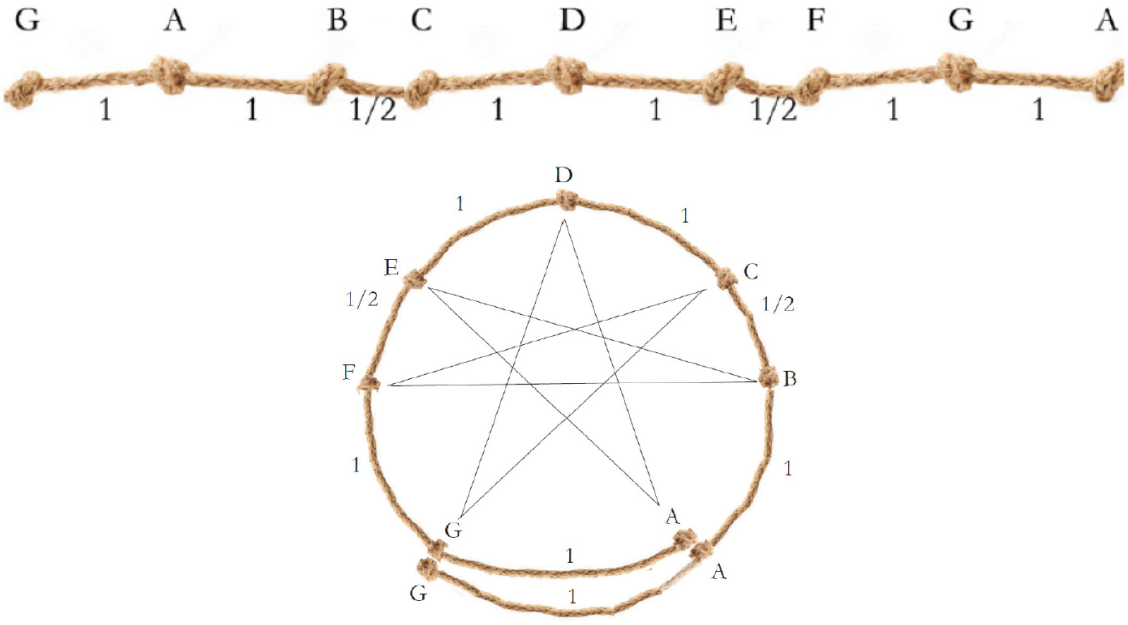


Figure 24. From linear diatonic, heptatonic, top, to cyclical diatonic, ditonic heptatonic

It is highly probable that the irregularity of the heptagram is the consequence of the attempt at describing a heptatonic system with representation of tones and semitones. See below.

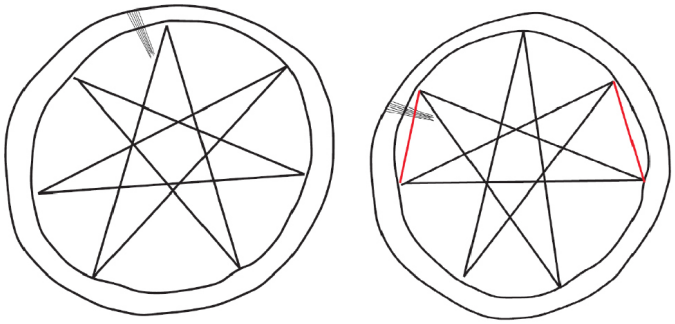


Figure 25. Left, heptagram as it is orientated in the original text. Right, heptagram rotated to located semitones in symmetry, at both sides, delineated with red lines

This inscription of a heptagram within two concentric circles may be the description of a device consisting of two metal circles rotating one on top of the other with the principal point of the heptagram pointing to a different pitch name from which the contents of a given scale could be given. It is worth mentioning that this type of device has been known for some decades to help budding musicians. Surprisingly, some writers claim to this day that they are the inventor of the system. *Nihil sub sole novum...*

Interlude

I will propose a detailed analysis of *nabnītu* xxxii as this is essential to the understanding of the systemics of U.7/80.

This text is the longer-lasting description of Ancient Sumero-Babylonian music theory. There are precursor copies of this manuscript dating to the Old-Babylonian Period and the Sumerian parts of it suggest an even older origin. This text which is descriptive but can be construed as descriptive because of the way in which the texts is composed.

The text explains the different phases of the development of theory during a period of about 3000 years, their slow metamorphosis from pentatonism to enneatonism and to heptatonism. It is therefore the most important text of theory ever discovered.

nabnītu xxxii (uktin [uk].tin / SIG_7 ALAN)

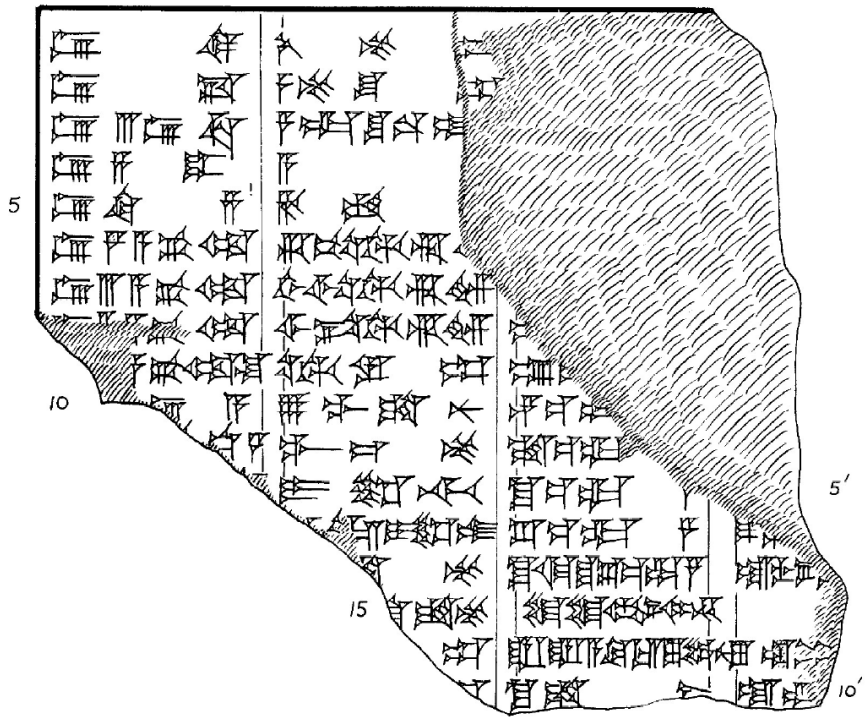


Figure 26, Gurney's copy of U.3011 = UET VII, 126 = *nabnītu* xxxii Only columns 1 and 2 are relevant. The tablet appears in *Ur Excavations Texts. Publications of the joint expedition of the British Museum and of the University Museum of the University of Pennsylvania, Philadelphia, to Mesopotamia. Volume VII, Middle Babylonian Legal Documents and other Texts.* Oliver R. Gurney. Note the lacuna in L.4 Col.2 which was later corrected in *IRAQ* XLVI 82, note 1. Professor Gurney writes back to me on this matter on the 15th April 1996: ....I must have left the end of the line for a second look because it was dirty or otherwise difficult to read and then forgotten to come back to it. This happened to me several times!

Introduction

Sir Leonard Woolley (1880-1960) found a fragmentary copy of the tablet at Ur in Southern Mesopotamia, south of the main courtyard of the Dublamaḫ temple, in the late twenties. This tablet is Neo-Babylonian, about 800/600 BC. However, the knowledge it includes is certainly much older as it describes, possibly, the stringing of an archetypal lyre fitted with nine strings. Although most copies of this lexical series are relatively late, around the middle of the first millennium BC, there is an Old-Babylonian precursor known as the 'Proto-*nabnītu*' published in UET VI, 358, and also Middle-Babylonian versions dated around 1000 BC, including one damaged copy.

The table below gives three interpretations, a), b) and c). a) is Finkel's interpretation of U.3011 (field number), being Woolley's find. b) extracts the five Sumerian names of strings at the beginning of the first five lines of the obverse of BM 65217+66616. c) is Krispijn's interpretation which shows slight differences with Finkel's.

Although the oldest version of this text is not earlier than Old-Babylonian, its structure, which is descriptive, suggests a much older source which I would place at the dawn of literacy if not earlier, propagated in oral transmission as this text has an undeniable, pre-literate visual origin. I will explain this audacious hypothesis in due time.

This text is the thirty-second tablet of the series nabnītu. Copies would have been distributed widely, during a number of centuries, possibly even millennia in the various provinces and kingdoms of the Occidental Orient as it certainly was a type of encyclopædia essential to scholarly institutions, temples and palaces.

Some essential philological remarks about U.3011 are essential before discussing the musicological significance of this bilingual, text.

1) In a) and c), the Akkadian is partly but not entirely a literal translation of the Sumerian.

2) We assume that the Sumerian entries are descriptive and are the names and locations of each of the nine strings.

3) There appears be a tonal interrelationship between lines 1 and 5 in a).

4) Lines 9 to 5 seem to stand in symmetry with lines 5 to 1.

5) We take *qud-mu-um*, in line 1, as the adjective *qudmû*, meaning 'front', following the explicit writing *qud-mu-ú* in CBS 10996, rather that the noun *qudmu*, 'front'.

6) Similarly, we take *šá-mu-šu-um* to stand for the adjective *šamušû*, 'adjacent', understanding Sumerian **sa-uš** as **sa-ús**, the underlying Akkadian verb being *emēdu*. *šá-mu-šu-um*, is reconstructed as **sa-uš**>**sawuš** with /**w**/ as a glide. The /**w**/ is written with phonograms containing /m/ from the Old-Babylonian Period onwards (Von Soden 1995, GAG §21d).

7) We take *úḫ-ru-um* in line 9 as the adjective *uḫrû*, rather than the noun *uḫru*, 'rear' as found in lines 6 to 8.

lines		Sumerian	Translation	Akkadian	Translation
l.1	a)	**sa.di**	string DI	*qud-mu-⌜um⌝*	prime? string
	b)	**di.iš.šú**	first	*qud-mu-ú*	first
	c)	**sa.sá** (=**DI**)	'rival' string	*qud-mu-⌜um⌝*	front? string
l.2	a)	**sa.úš**	adjacent string	*šá-mu-šu-um*	adjacent (string)
	b)	**me.in**	second	*šá-mu-ši*	second
	c)	**sa.úš**	next string	*šá-mu-šu-um*	next string (loan word from Sumerian **sa-úš**
l.3	a)	**sa.3.sa.sig**	string 3 string thin	*šá-al-šu qa-a⌜t-nu⌝*	third (string) thin
	b)	**e.šà**	third	*šal-šú qa-at-nu*	third (string) thin
	c)	**sa.3.sa.sig**		*šá-al-šu qa-at-nu*	third (string) thin
l.4	a)	**sa.4.tur**	string 4 small	A-[DÙ]	Ea-*banû* Ea-the creator
	b)	**lam.ma**	fourth	*a-ba-nu*	Ea-*banû* Ea-the creator
	c)	**sa.4.tur**	string 4 small	<*d*^{ê}>-*a*.[**dú**]	Ea-the creator
l.5	a)	**sa.di.*5**	string **DI** 5	*ḫa-am-*[*šu*]	fifth (string)
	b)	**ja**	fifth	*ḫa-an-šu*	fifth
	c)	**sa.sá** (=**DI**).**5**!	fifth 'rival' string	*ḫa-am-*[*šu*]	fifth (string)
l.6	a)	**sa.4.a.ga.gul**	string 4 rear	*ri-bi úḫ-ri-*[*im*]	fourth of the rear (string)
	b)		fourth string of the bigger back		
	c)	**sa.4.a.ga.gul**		*ri-bi úḫ-ri-*[*im*]	fourth of the back (string)
l.7	a)	**sa.3.a.ga.gul**	string 3 rear	*šal-ši úḫ-ri-im*	third of the rear (string)
	b)			*šal-ši úḫ-ri-im*	
	c)	**sa.3.a.ga.gul**	third string of the bigger back		third of the back (string)
l.8	a)	**⌜sa.2.a.ga⌝.gul**	string 2 rear	*ši-ni úḫ-ri-im*	second of the rear (string)
	b)				
	c)	**⌜sa.2.a.ga⌝.gul**	second string of the bigger back	*ši-ni úḫ-ri-im*	second of the back (string)
l.9	a)	[**sa.1**].⌜**a**⌝.**ga.gul.la**	string 1 rear		rear (string)
	b)				
	c)	[**sa.1**].⌜**a**⌝.**ga.gul.la**	first string of the bigger back	*úḫ-ru-um*	back (string)
l.10	a)	**9 ⌜sa⌝.a**	9 strings		9 strings
	b)				
	c)	**9 ⌜sa⌝.a!**	They are 9 strings	9 *pi-it-nu*	9 strings

Figure 27. a) Finkel's interpretation from U.3011; b) Kilmer's interpretation from BM 65217+66616, first five lines. c) Krispijn's interpretation of U.3011.

Obv.

1.**di**.**iš**.**šú** *qud-mu-u* ...
2.**me**.**in** *šá-mu-ši* ...
3. ...
4. **e**.**šà** *šal-šú qa-at-nu* ...
5....
6. **[l]am**.**ma** *a-ba-nu* ...
7. ...
8. **i̯a** *ḫa-an-šu* ...

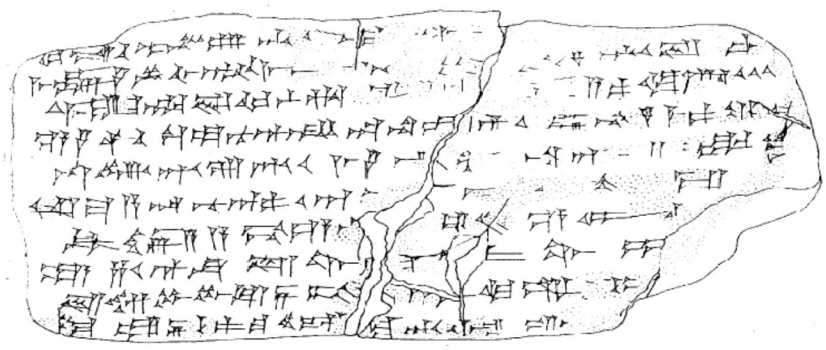


Figure 28. Obverse of text BM 65217 + 66616. Only the string names are transliterated.

The first question that strikes the reader of this text is why the first two strings in Sumerian and Akkadian are not simply called 'string 1' and 'string 2,' what is the meaning of 'small', 'thin' and 'Ea-the creator', and why the first line has **sa.di** without '1' while the fifth line has **sa.di** with, we think '5', although Gurney sees '4'. What is the meaning of **sa.di**? These writings cannot encapsulate some extraordinary or unintelligible system of pitches but can be explained musicologically. As we will see, the third and fourth strings give a clear indication of the transition from anhemitonism to hemitonism. What is more, the nine-string system enshrined in *Nabnitu* xxxii reappears in later arrangement of pitch subsets.

Structuralism

According to Claude Lévi-Strauss, cultures are viewed as systems which are analysed in terms of the structural relations among their elements. Thus patterns in cultural systems of which musical systems are part, are products of the structure of the human mind.

The original layout of the earliest theoretical system came from the yoke of the monumental lyre. It is a linear structure, a straight and slender wooden stick, on which strings are tuned by means of levers to satisfy the cultural sphere with which they identify.

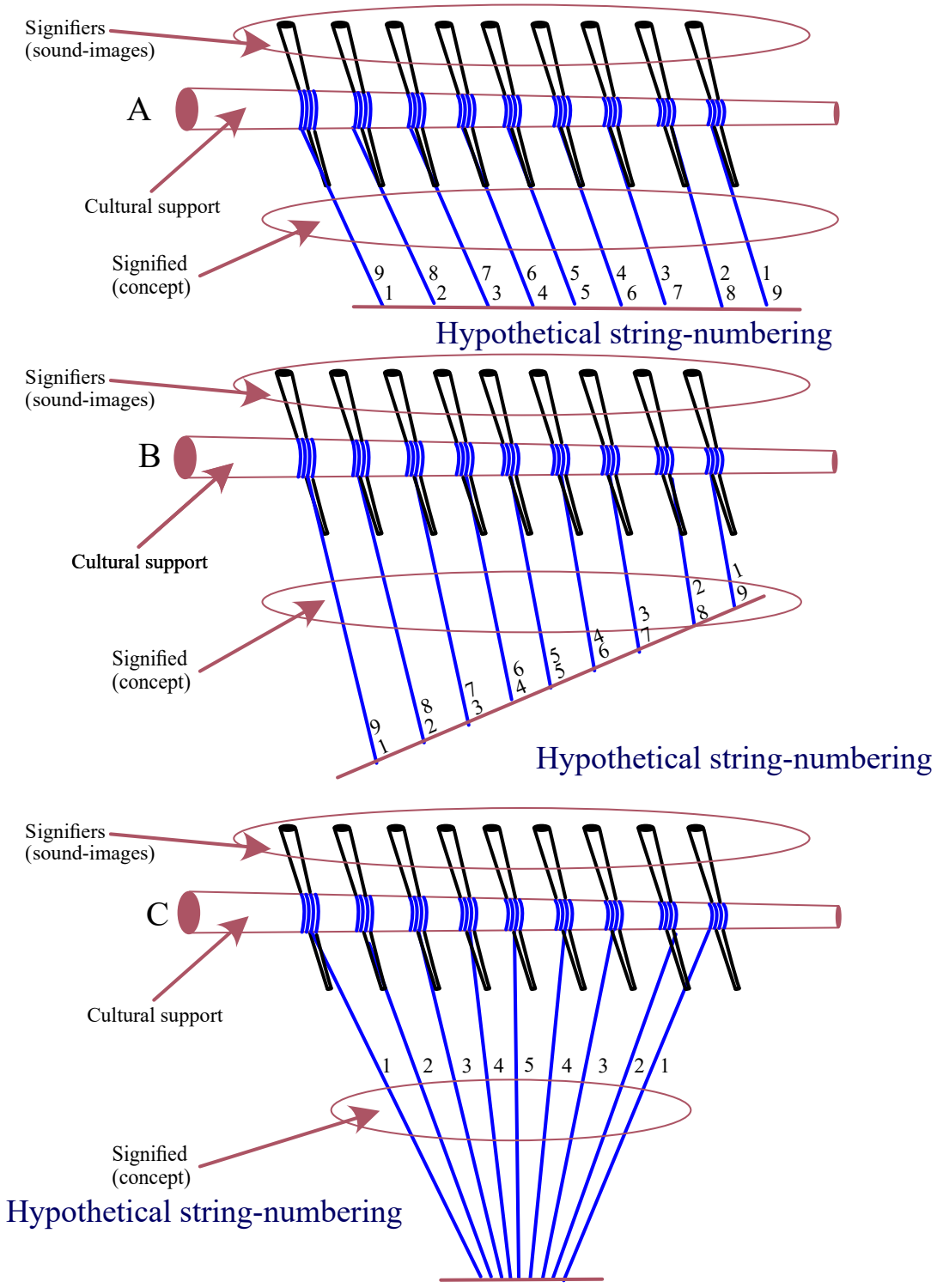


Figure 29. Psycho-genetic construction of the cultural support with its signifiers (sound-images) and its signified (concepts).

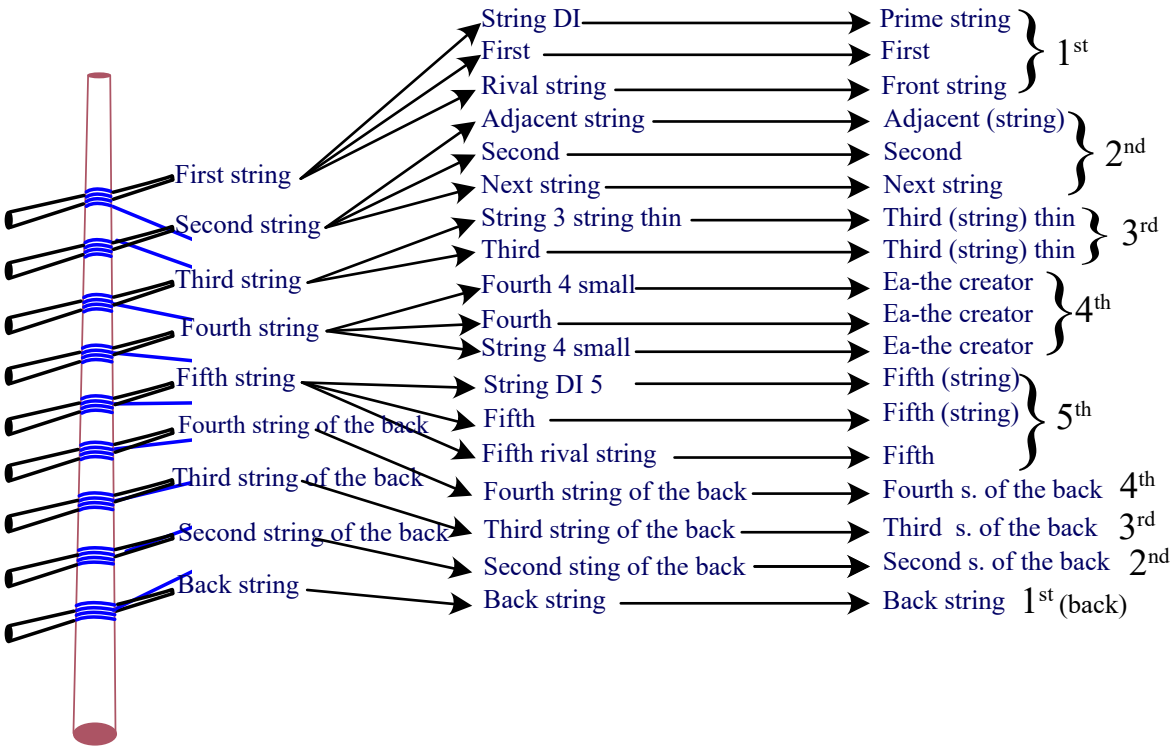


Figure 30. Schematic representation of the paradigmatic yoke.

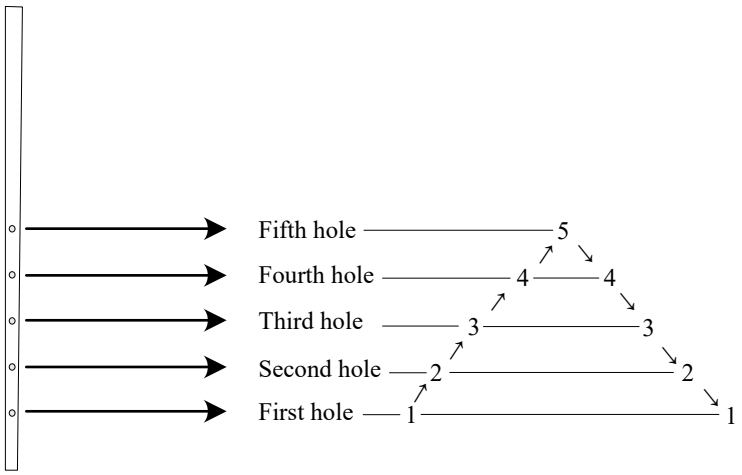
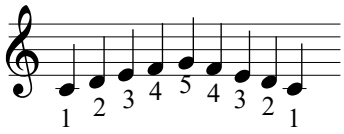


Figure 31. Schematic representation of the paradigmatic (pipe) yoke.

The concept of linear theory

Prior to being written down, the concept in this text would have been stored in the unconscious and translated in the conscious, as a linear structure where the tuning levers (or holes on pipes) are the signifiers and the strings (or wind-sounds), the signified. This would be the paradigmatic psycho-genetic system in U.3011 and would apply to general theory. The yoke would become the standard from which rules are set. Later it became the monochord of the Greeks which lasted up to modern times in Occidental musicology although the Western Orient preferred cyclicism which they invented during the middle of the first millennium BC. Cyclic theory never caught up with the Greeks and the Romans but was there to stay in the Near and Middle-East.

The common denominator in my schematic representations of text U.3011 is a series of numbers 1-2-3-4-5-4-3-2-1. Many would be tempted to conclude that this would represent the following:



Although there is no reason to associate it with the pitches in the above notation.

However, there is a XVIIIth Dynasty musicians playing a giant lyre. Block from a temple to the Aten at Karnak.

Figure 32. Block from a temple to the Aten at Karnak, XVIIIth Dynasty.

With time, the horizontality of the system - represented by the yoke of the lyre - translated into the textual verticality of a list, easier to write and read on a clay tablet. Later, to the Sumerian list an Akkadian translation was added and some time later, variations to the Akkadian as the system evolved which explains that in *nabnītu* xxxii, and other copies made at different periods, the Akkadian diverged from the Sumerian for certain of its strings.

With the string numbering written symmetrically, 1-2-3-4-5-4-3-2-1, it did not really matter which string 1 was at the beginning or at the end of the list. However, with musicological clues, it was the thinnest string, or the treble-most which was first on the list while the bass-most was at the bottom of somehow agreeing with the Sumerian terms ‘string of the bigger back’ which would be more appropriate for a bass string than ‘fore string’.

Model A, at the top represents a straight yoke fitted with tuning levers. The strings run parallel and are of the same length, hypothetically. It is therefore highly probable that they would have been numbered from 1 to 9, or perhaps 9 to 1. This would be a matter of convention. It would have been anomalous, considering the string pattern that another numbering applied and I shall not even propose this hypothesis.

Model B has a clear and orderly decrease in the length of its strings. Nevertheless, the numbering of the strings should be similar to Model A.

With model C, the shortest string is the middle, the longest at the extremities. The remaining strings follow the pattern on my illustration.

U.7/80 = UET VII, 74 (Circa 1800 BC), right column

Figure 33. Cast of U.7/80. Photograph by the author, with courtesy of the Trustees of the British Museum.

Introduction

The interpretation of this text has been the victim of the greatest misunderstanding of all times in the history of Ancient musicology. The reason was the consequence of a combination of factors which have eluded the scrutiny of (or the lack of) musicological competence alongside intentional falsification of the evidence motivated by two factors. The first factor was the imperative need for some unscrupulous writers to match the instructions in U.7/80 with their flawed interpretation of CBS 10996, published about five years earlier, so that both texts supported each other while covering up for their distorted interpretation of the aforementioned text. The second factor was to incorporate the epistemology of U.7/80 into the Western Universalist mould. The methodology was so subtly insidious that the output has been generally consecrated by most in astonishing obnubilation.

It is not my intention to undertake a systematic deconstruction of the accredited interpretations of this text in the present work. I have done this elsewhere. However, I will draw a comparative presentation of my interpretation with others, when relevant, in order to help the reader understand the blunders in previous conclusions as it is my duty as a relativist musicologist to present my version which meticulously excludes any alteration of the evidence.

Sources

U.7/80 dates from the Old-Babylonian Period, about 1800 BC. Apart from a small flake which would be the copy of part of another contemporary tablet, archaeology has not produced any other issue. However, the presence of this flake, however coincidental it may be, would possibly suggest that this manuscript was well-known during the Old-Babylonian Period. There are no other copies written before 1800 BC.

It was unearthed by Sir Leonard Woolley at Ur in the nineteen-twenties. Professor Gurney published it some forty years later, in 1968. At that time no one had yet thought that the scale might be descending and in spite of my attempts at promoting the idea on the basis of Greek, Oriental and other models, I was ignored. After having asked advice from the then Magdalen Music Master at Oxford, David Wulstan, Gurney published his paper, taking the system as if it were ascending.

Then, in 1982, the Syrian Raoul Gregory Vitale also advanced that the system was descending but was likewise ignored. Finally, in 1990, Assyriologist colleague and friend Th.J.H. Krispijn perceived a new reading of line 12 as *nu-su-ḫ*[*um*, a form of the verb *nasāḫum*, 'to tighten'. This new term *nasāḫum*, Sumerian **gíd.i**, or *nussuḫum*, Sumerian **zi.zi**, is the technical verb for 'to tighten' strings. Its antonym is *ne'ûm*, Sumerian **tu.lu**. Subsequently Gurney published another paper in 1994 which concluded that the Babylonian system was descending because the strings were tightened in the first part and loosened in the second. All, or almost all, even Universalists, agreed with Gurney. Finally, it was philology which won the case for musicology showing the contempt of Assyriologists towards musicologists.

A reminder of U.3011 (nabnītu xxxii) and CBS 10996

Text *nabnītu* xxxii, (U.3011 henceforth) which was discussed earlier in this work, is a pitch nomenclature of an enneatonic generative set made up of two melodic fifths in conjoined motion: *embūbum* and *pītum* or a-g-f-e-d and d-c-b-a-g, respectively, amounting to the pitch set of *pītum* or a-g-f-e-d-c-b-a-g. In full: [‘**sa.di**; **sa.úš**; **sa.**3**.sa.sig**; **sa.**4**.tur**; **sa.di.**5’] and [‘**sa.di.**5; **sa.**3**.a.ga.gul**; **sa.**2**.a.ga.gul**; **sa.**1**.a.ga.gul.la**’]. Numerically it is: 1f-2f-3f-4f-5-4r-3r-2r-1r, where superscripted suffix ‘f’ indicates ‘(string)-of the front’, and superscripted suffix ‘r’indicates ‘(string)-of the rear’. However, this set must never be numbered 1-2-3-4-5-6-7-8-9, either in U.3011, CBS 10996 or with U.7/80, because strings are never numbered in this manner anywhere, in any text. Therefore, should anyone insist to number these strings from one to nine (1-2-3-4-5-6-7-8-9), this would amount to blatant falsification of the evidence with the intent of suggesting that Babylonian pitch sets were made of seamless series of nine pitches into which falsifiers located heptatonism and octaves to fit in with their misguided assumptions. Had they correctly transliterated and translated what is really written, they would have realised that their assumptions were wrong.

Furthermore, it remains incomprehensible that while they recognised the Ancient Greek construction of two conjoined or disjoined tetrachords, amounting to a heptatonic or to an octatonic pitch set, respectively, they rejected the hypothesis of a Babylonian enneatonic pitch set of two conjoined pentachords. The reason is that it did not suit their ideologically fuelled Universalist heptatonism, and decreed that therefore, a Babylonian heptatonic pitch set would somehow be floating within a span of nine strings, and while there were nine strings listed, it was seven that was meant.

In his Ancient Greek music, West writes:

‘...most of the fifth-century scales of which we have any knowledge did not exceed the octave. One of them, however, the Dorian of the Damonian set extended over a ninth. It incorporated two disjunct tetrachords plus a further note a tone below Hypatē. The lower part of the Phrygian Scale had a similar structure. [Both amounting to an enneachord][11]’.

The right column

The tablet is badly damaged with its sides broken away. We note that it is divided in two columns. We shall first discuss the column to the right. The text was restored by means of extrapolation on the basis that line 12 appeared to be the axis from which lines 13 to 16 flow in symmetry with lines 8 to 11 (the only remaining lines). Therefore, we take it that the instructions in this text are set in quatrains and exhibit a pattern similar to the symmetry in U.3011. The diagram below illustrates this analogy.

Therefore, the systems described, in U.3011 and prescribed in U.7/80, are linear descending diatonic and enneatonic. They validate each other. Without the symmetric nature of the instructions given in the two quatrains sitting on each side of the axis of symmetry (line 12), it would have been impossible to say how the text started or finished. It was on the basis that the first fifth (1-5) in CBS 10996 is *niš tuḫrim*, that I hypothesised that U.7/80, too would have started with this interval which would have conjoined with the fifth *qablītum* amounting to the pitch set of *išartum*.

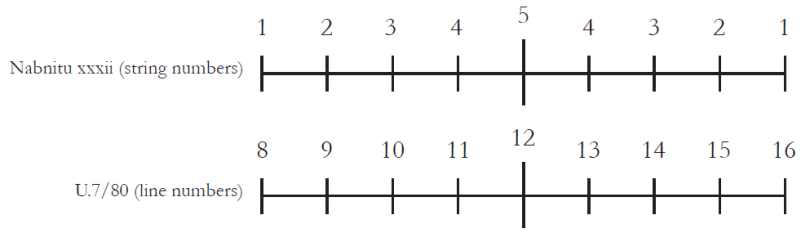


Figure 34. Systemic analogy between U.3011 and U.7/80. Note that the numbers for the representation of U.7/80 are the line numbers of the text and not string numbers (which can be substituted to the string numbers in U.3011).

Thus we uphold that U.7/80 gives instructions for the construction of a series of seven descending enneatonic pitch sets sharing the names of the seven fifths in U.3011.

U.7/80 is further evidence of the remarkable creative genius of Babylonian scholarship. The method prescribed in this system was never equalled by any other civilization as it translates a dynamic disposition into its thetical form.

- Each sequence is written in the form of a quatrain.

The quatrain starting at line 4 has the following structure:

- The first line says that if the **ZÀ.MÍ**-instrument is (tuned) in 'x'.
- The second line locates a '*la zaku*' (unclear) interval. (By its name only and

not by its numeric position)

- The third line instructs which string(s) should be tensioned. (By name(s) not by number(s))

- The fourth line says that as a result of this tension the '*la zaku*' interval is now '*iz-za-ku*' (clear) and has generated a new pitch set.

Figure 35. Gurney's hand copy of the right column.

Quatrain starting at line 8:

The first line says that the **ZÀ.MÍ**-instrument is (tuned) to the interval and therefore the pitch set having the same name, which ended the previous quatrain.

- The second line locates a '*la zaku*' (unclear) interval. (By its name only and not by numbers)

- The third line instructs which string(s) should be tensioned. (By name(s) not number(s))

- The fourth line says that as a result of this tension the '*la zaku*' (unclear) interval is now '*iz-zaku*' (clear) and has generated a new pitch set having the same name.

At line 13 the process is reversed.

This text presents a combination of the following: 1) Each quatrain starts with a conjunction introducing a conditional clause, the protasis, and finishes with an implied apodosis: 'if...then'. 2) It mentions a string instrument, the **ZÀ.MÍ** 3) It gives the names of intervals as they are known from text CBS 10996. 4) The names of nine strings as they are known from U.3011. 5) Verbs ordering tension and or relaxation. 5) A term in the negative and in the positive, qualifying an interval (*la zaku* and *iz-za-ku*). Since there are nine string/pitches listed, this proves that the instructions in the text were related to the nine string listed in U.3011, and not to their heptatonic status in CBS 10996.

Therefore this text is about instructions directed towards an instrument fitted with nine strings, or about instructions directed towards an enneatonic system. Rightly, some will argue that there should be a distinction between span and system. However, in this case the instructions apply to all nine strings and therefore proves that their application was directed towards an enneatonic system and that the usage of an enneachordal instrument was mainly illustrative. Had the text been dedicated to a heptatonic system, then only seven string would have sufficed. The structure of the quatrains would have been easily adapted accordingly.

Gurney's transliteration of the tablet in its current state is given below at the next page.

[*šum-ma* ^{giš}**ZÀ.MÍ** *pi-i-tum-ma*]
1 [*e-e*]*m-b*[*u-bu-um la za-ku*]
2 *ša-al-š*[*a-am qa-at-na-am tu-na-sà-aḫ-ma*]
3 *e-em bu-bu-u*[*m iz-za-ku*]

4 *šum-ma* ^{giš}**Z**]**À.MÍ** *e-em-bu-bu-um-ma*]
5 *ki-it-mu-um* [*la za-ku*]
6 *re-bi úḫ-ri-im* [*tu-na-sà-aḫ-ma*]
7 *ki-it-mu-um i*[*z-za-ku*]

8 *šum-ma* ^{giš}**ZÀ.MÍ** *k*[*i-it-mu-um-ma*]
9 *i-šar-tum la za-*[*ka-at*]
10 *ša-mu-ša-am ù-úḫ-ri-a-a*[*m tu-na-sà-aḫ-ma*]
11 *i-šar-tum iz-za-*[*ku*]

12 *nu-su-ḫ*[*u-um*]

13 *šum-ma* ^{giš}**Z**]**À.MÍ** *i-šar-t*[*um-ma*]
14 *qa-ab-li-ta-am ta-al-pu-*[*ut*]
15 *ša-mu-ša-am ù-úḫ-ri-a-am te-*[*ni-e-ma*]
16 [^{giš}]**ZÀ.MÍ** *ki-it-mu-*[*um*]

17 [*šum*]*-ma* ^{giš}**ZÀ.MÍ** *ki-it-m*[*u-um-ma*]
18 [*i-ša*]*r-ta-am la za-ku-ta-am t*[*a-al-pu-ut*]
19 [*re-bi*] *úḫ-ri-im te-ni-e*![*-ma*]
20 [^{giš}**ZÀ.MÍ** *e-em-bu-bu-um*]

Prior to my demonstration, it is indispensable to understand the structure of the Sumerian-Babylonian scalar system. These pitch sets have been extrapolated from U.3011, from my reconstruction of CBS 10996, and from the instructions in U.7/80.

It will be useful for the reader to refer to the table below.

Part 1

Dynamic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c-b-a-g-f-e-d-c-b
Thetic fifths nīš *tuḫrim* + *qablītum*	= set of *išartum*	= c-b-a-g-f-e-d-c-b
Dynamic fifths *qablītum* + *išartum*	= set of *qablītum*	= f-e-d-c-b-a-g-f-e
Thetic fifths *qablītum* + *išartum*	= set of *qablītum*	= c-b-a-g-f♯-e-d-c-b
Dynamic fifths *išartum* + *kitmum*	= set of *nīš tuḫrim*	= b-a-g-f-e-d-c-b-a
Thetic fifths *išartum* + *kitmum*	= set of *nīš tuḫrim*	= c♯-b-a-g-f♯-e-d-c♯-b
Dynamic fifths *kitmum* + *embūbum*	= set of *nīd qablim*	= e-d-c-b-a-g-f-e-d
Thetic fifths *kitmum* + *embūbum*	= set of *nīd qablim*	= c♯-b-a-g♯-f♯-e-d-c♯-b
Dynamic fifths *embūbum* + *pītum*	= set of *pītum*	= a-g-f-e-d-c-b-a-g
Thetic fifths *embūbum* + *pītum*	= set of *pītum*	= c♯-b-a-g♯-f♯-e-d♯-c♯-b
Dynamic fifths *pītum* + *nīd qablim*	= set of *embūbu*	= d-c-b-a-g-f-e-d-c
Thetic fifths *pītum* + *nīd qablim*	= set of *embūbu*	= c♯-b-a♯-g♯-f♯-e-d♯-c♯-b
Dynamic fifths *nīd qablim* + *nīš tuḫrim*	= set of *kitmu*	= g-f-e-d-c-b-a-g-f
Thetic fifths *nīd qablim* + *nīš tuḫrim*	= set of *kitmu*	= c♯-b-a♯-g♯-f♯-e♯-d♯-c♯-b
Dynamic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c-b-a-g-f-e-d-c-b
Thetic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c♯-b♯-a♯-g♯-f♯-e♯-d♯-c♯-b♯

Part 2

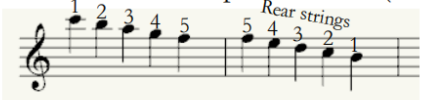
Thetic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c♯-b♯-a♯-g♯-f♯-e♯-d♯-c♯-b♯
Dynamic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c-b-a-g-f-e-d-c-b
Thetic fifths *nīd qablim* + *nīš tuḫrim*	= set of *kitmu*	= c♯-b-a♯-g♯-f♯-e♯-d♯-c♯-b
Dynamic fifths *nīd qablim* + *nīš tuḫrim*	= set of *kitmu*	= g-f-e-d-c-b-a-g-f
Thetic fifths *pītum* + *nīd qablim*	= set of *embūbu*	= c♯-b-a♯-g♯-f♯-e-d♯-c♯-b
Dynamic fifths *pītum* + *nīd qablim*	= set of *embūbu*	= d-c-b-a-g-f-e-d-c
Thetic fifths *embūbum* + *pītum*	= set of *pītum*	= c♯-b-a-g♯-f♯-e-d♯-c♯-b
Dynamic fifths *embūbum* + *pītum*	= set of *pītum*	= a-g-f-e-d-c-b-a-g
Thetic fifths *kitmum* + *embūbum*	= set of *nīd qablim*	= c♯-b-a-g♯-f♯-e-d-c♯-b
Dynamic fifths *kitmum* + *embūbum*	= set of *nīd qablim*	= e-d-c-b-a-g-f-e-d
Thetic fifths *išartum* + *kitmum*	= set of *nīš tuḫrim*	= c♯-b-a-g-f♯-e-d-c♯-b
Dynamic fifths *išartum* + *kitmum*	= set of *nīš tuḫrim*	= b-a-g-f-e-d-c-b-a
Thetic fifths *qablītum* + *išartum*	= set of *qablītum*	= c-b-a-g-f♯-e-d-c-b
Dynamic fifths qablītum + išartum	= set of qablītum	= f-e-d-c-b-a-g-f-e
Thetic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c-b-a-g-f-e-d-c-b
Dynamic fifths *nīš tuḫrim* + *qablītum*	= set of *išartum*	= c-b-a-g-f-e-d-c-b

Separate Analysis of the Quatrains of the First Part

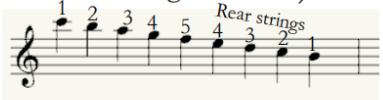
N.B. I will only give a detailed procedure for the first quatrain of the first part and then give the interpretation of the seven quatrains of the first part, without a detailed explanation in the hope that my explanations have been sufficiently clear.

First part
This first quatrain is
I If the harp is *išartum* (*nīš tuḫrim*) + *qablītum* = (Thetic c-b-a-g-f-e-d-c-b) (Dynamic c-b-a-g-f-e-d-c-b)
II The 'unclear interval' is *qablītum*. It is placed between string 5 and string 1 of the rear.
III tighten by a 'semi-tone' string 5 (c-b-a-g-f#-e-d-c-b)
IV the harp will be *qablītum* (= thetic c-b-a-g-f♯-e-d-c-b or dynamic f-e-d-c-b-a-g-f-e)

I If the harp is *išartum* (*nīš tuḫrim* + *qablītum* = c-b-a-g-f-e-d-c-b)

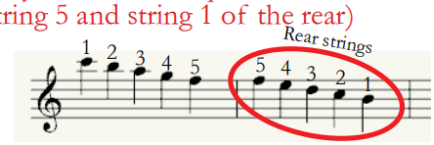


nīš tuḫrim + *qablītum* equals



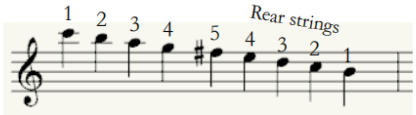
išartum

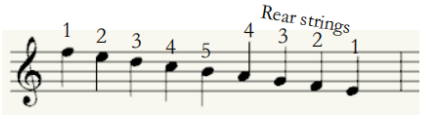
II the 'unclear interval' between strings 5 and 2 is *qablītum* (the text does not mention 5 and 2. It only mentions the *qablītum* interval which, if it were given in numbers, would be string 5 and string 1 of the rear)



la zaku 'unclear' interval in the red ellipse

III tighten by a 'semi-tone' string 5 (c-b-a-g-f♯-e-d-c-b)

IV the harp will be *qablītum* (= thetic c-b-a-g-f♯-e-d-c-b or dynamic f-e-d-c-b-a-g-f-e)

qablītum in the thetic



qablītum in the dynamic

Commentary:

The scale of *išartum* is made up from the interval *nīš tuḫrim* plus the interval of *qablītum* = c-b-a-g-f (1-2-3-4-5)+ f-e-d-c-b (5-4-3-2-1) = c-b-a-g-f-e-d-c-b = 1-2-3-4-5-4-3-2-1. Therefore the unclear interval is located between strings 5 and string 1of the rear.

I would like to remind the reader that the '*la zaku*' unclear fifths are located at the following positions in the various sets:

In *išartum*, the fifth *qablītum* is '*la zaku*'. It is placed on 5 - 1 rear
In *qablītum*, the fifth *nīš tuḫrim* is '*la zaku*'. It is placed on 1front - 5
In *nīš tuḫrim*, the fifth *nīd qablim* is '*la zaku*'. It is placed on 4 front - 2 rear
In *nīd qablim*, the fifth *pītum* is '*la zaku*'. It is placed on 3 rear - 4 front
In *pītum*, the fifth *embūbum* is '*la zaku*'. It is placed on 3 front - 3 rear
In *embūbum*, the fifth *kitmum* is '*la zaku*'. It is placed on 4 rear - 3 front
In *kitmum*, the fifth *išartum* is '*la zaku*'. It is placed on 2 front - 4 rear

First part

First quatrain

I If the **ZÀ.MÍ** is *išartum* (*nīš tuḫrim* + *qablītum*) (c-b-a-g-f-e-d-c-b)(c-b-a-g-f-e-d-c-b).
II The 'unclear interval' is *qablītum* (f-e-d-c-b).
III Tighten string 5.
IV *qablītum* will be clear = (f-b♯) = (f-b♯).

Second quatrain

I If the **ZÀ.MÍ** is *qablītum* (*qablītum* + *išartum*) = (c-b-a-g-f♯-e-d-c-b)(f-e-d-c-b-a-g-f-e).
II The 'unclear interval' is *nīš tuḫrim* = (f-e-d-c-b).
III Tighten strings 1of the front and string 2 of the rear.
IV *nīš tuḫrim* will be clear = (c♯-f♯) = (f♯-b).

Third quatrain

I If the **ZÀ.MÍ** is *nīš tuḫrim* (*išartum* + *kitmum*) = (c♯-b-a-g-f♯-e-d-c♯-b)(b-a-g-f-e-d-c-b-a).
II the 'unclear interval' is *nīd qablim* (f-e-d-c-b).
III tighten string 4 of the front.
IV *nīd qablim* will be clear = (g♯-c♯) = (f♯-b).

Fourth quatrain

I If the **ZÀ.MÍ** is *nīd qablim* (c♯-b-a-g♯-f♯-e-d-c♯-b)(e-d-c-b-a-g-f-e-d).
II the 'unclear interval' is *pītum* (the text says 3r-4f). We note that in la zaku (unclear) interval is atypical as its inverted and is located from the third string of the rear to the fourth string of the front and is reduced to a fourth b-f.This inversion is meaningful as it suggests that the system was larger that the enneachord.
III tighten string 3 of the rear.
IV *pītum* will be clear = (g♯-d♯) = (b-f♯).

N.B., Should the unclear interval not be inverted this would have extended the pitch set down by two pitches, i.e. e-d-c-b-a-g-f-e-d-**c-b.**

Fifth quatrain

I If the **ZÀ.MÍ** is *pītum* (c♯-b-a-g♯-f♯-e-d♯-c♯-b) (a-g-f-e-d-c-b-a-g).
II the 'unclear interval' is *embūbum* (f-e-d-c-b).
III tighten string 3 of the front.
IV *embūbum* will be clear = (a♯-d♯) = (f♯-b).

Sixth quatrain

I If the **ZÀ.MÍ** is *embūbum* (c♯-b-a♯-g♯-f♯-e-d♯-c♯-b) (d-c-b-a-g-f-e-d-c).
II The 'unclear interval' is *kitmum* (fourth string of the rear and third string of the front) (f-b).We note that the *la zaku* (unclear) interval is atypical as its inverted and located from the fourth string of the rear to the third string of the front and is reduced to a fourth (f-b). This second inversion reinforces my suggestion that the system was larger that the enneachord and that this inversion was an adaptation of a larger system to an enneatonic system. Let us remember that this method was already used with text CBS10996.
III Tighten string 4 of the rear.
IV *kitmum* will be clear = (a♯-e♯) = (b-f♯)

N.B. Should the unclear interval not be inverted this would have extended then pitch up by two pitches, i.e. **b-a**-g-f-e-d-c-b-a-g-f.

Seventh quatrain

I If the **ZÀ.MÍ** is *kitmum* (c♯-b-a♯-g♯-f♯-e♯-d♯-c♯-b) (g-f-e-d-c-b-a-g-f).
II The 'unclear interval' is *išartum* second string of the front and fourth string of the rear.
III Tighten string 2 of the front and 1 of the rear.
IV *išartum* will be clear = (b♯-e♯) = (f♯-b).

N.B. Had there been no inversions of the unclear intervals in quatrains four and sixth, the system would have extended to a tridecachord, in perfect coordination with my interpretation of text U.3011. c-b-a-g-f-e-d-c-b-a-g-f-e, a system made up of six conjoined thirds: c-b-a/a-g-f/f-e-d/d-c-b/b-a-g/g-f-e, or of three conjoined pentachords: c-b-a-g-f/f-e-d-c-b/b-a-g-f-e.

Line 13 reads *nu-su-ḫ*[*u-um*] and instructs that the whole process from the first part, quatrains one to seven must be reversed and therefore there is no point in explaining the method.

Below is the Western notation representation of the first part of the system, both dynamic and thetic. The '*la zaku*' intervals are indicated in red and arrows lead to the subsets to which they give their name.

N.B., In the second part which is the symmetry of the first part, the fourth line of the quatrains say that it is the instrument which is in the set of the appropriate set, i.e., the instrument will be *pītum,* meaning the set in which the instruments was tuned.

Now, the intervallic inversions in quatrains four and six clearly indicate that the enneachord was not wide enough to hold the system without these inversions and that the systemic ambitus should have spanned a tridecachord as unambiguously proved with my reconstruction of U.3011.

Thus, we may conclude that before the Old-Babylonian period, I cannot say for sure how long before, but the organology would lead me to the mid-third millennium BC, between the Early Dynastic First Dynasty of Ur and the First Dynasty of Lagash when lyres were most popular in the iconography and when they were fitted with numerous strings. However, the Silver Lyre of Ur at the British Museum appears to have had nine strings originally and that its span was then increased to eleven around 2600 BC, at the time of its burial. The illustrated photograph below shows the yoke, tuning levers, part of the upright and strings of my reconstruction of the silver lyre of Ur (ca. 2600BC). It is clear that string 1 to the left and string 11 to the right were later additions. String 1 would never have been set outside of the trapezoidal framework of the instrument and string 11 is slightly off the axis of symmetry while it should have stood in the middle of the yoke.

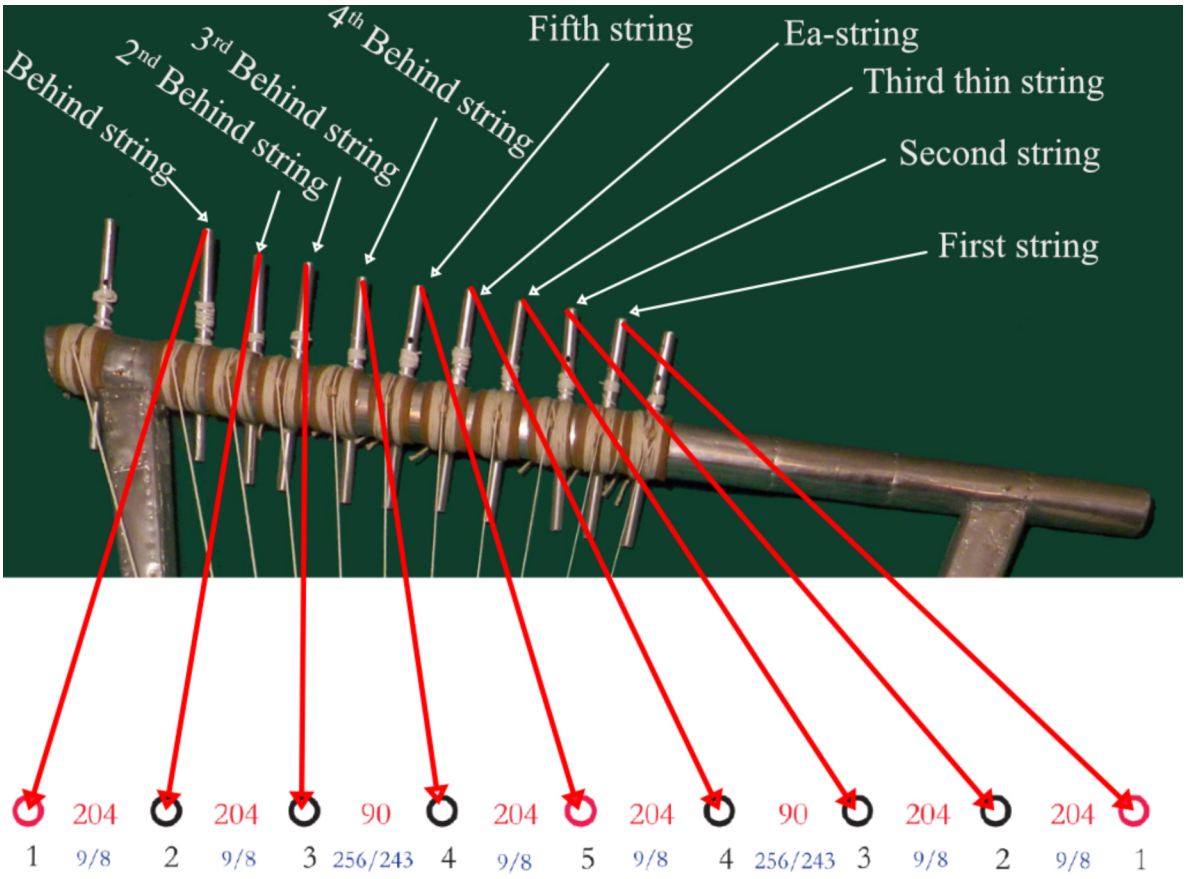

Behind string
2nd Behind string
3rd Behind string
4th Behind string
Fifth string
Ea-string
Third thin string
Second string
First string
204 204 90 204 204 90 204 204
1 9/8 2 9/8 3 256/243 4 9/8 5 9/8 4 256/243 3 9/8 2 9/8 1

Figure 36. Author's reconstruction of the Silver Lyre of Ur with annotation for the strings and their early ditonic quantification.

First Part

1. When **zami** *išartum*
qablītum unclear
tune up 5
qablītum clear

2. When **zami** *qablītum*
niš tuḫrim not clear
tune up 1 of the front and 2 of the back (not 1 and 8 as Gurney says)
niš tuḫrim clear

3. When **zami** *niš tuḫrim*
nīd qablim unclear
tune 4 of the front
nīd qablim clear

4. When **zami** *nīd qablim*
pītum unclear
tune up 3 of the back (not 7 as Gurney says)
pītum clear

5. When **zami** is *pītum*
embūbum unclear
tune up 3 of the front
embūbum clear

6. When the **zami** is *embūbum*
kitmum unclear
tune up 4 of the back (not 6 as Gurney says)
kitmum clear

7. When the **zami** is kitmum
išartum unclear
tune up 2 of the front and 1 of the back (not 2 and 9 as Gurney says)
išartum clear

Second Part

1. When **zami** *išartum*
qablītum unclear
tune down 2 of the front and 1 of the back (not 2 and 9 as Gurney says)
zami is *kitmum*

2. When **zami** *kitmum*
išartum unclear
tune down 4 of the back (not 6 as Gurney says)
zami is *embūbum*

3. When **zami** *embūbum*
kitmum unclear
tune down 3 of the front
zami is *pītum*

4. When **zami** *pītum*
embūbum unclear
tune down 3 of the back (not 7 as Gurney says)
zami is *nīd qablim*

5. When **zami** *nīd qablim*
pītum unclear
tune down 4 of the front
zami is *niš tuḫrim*

6. When **zami** *niš tuḫrim*
nīd qablim unclear
tune down 1 of the front and 2 of the back (not 1 and 8 as Gurney says)
zami is *qablītum*

7. When **zami** *qablītum*
niš tuḫrim unclear
tune down 5
zami is *išartum*

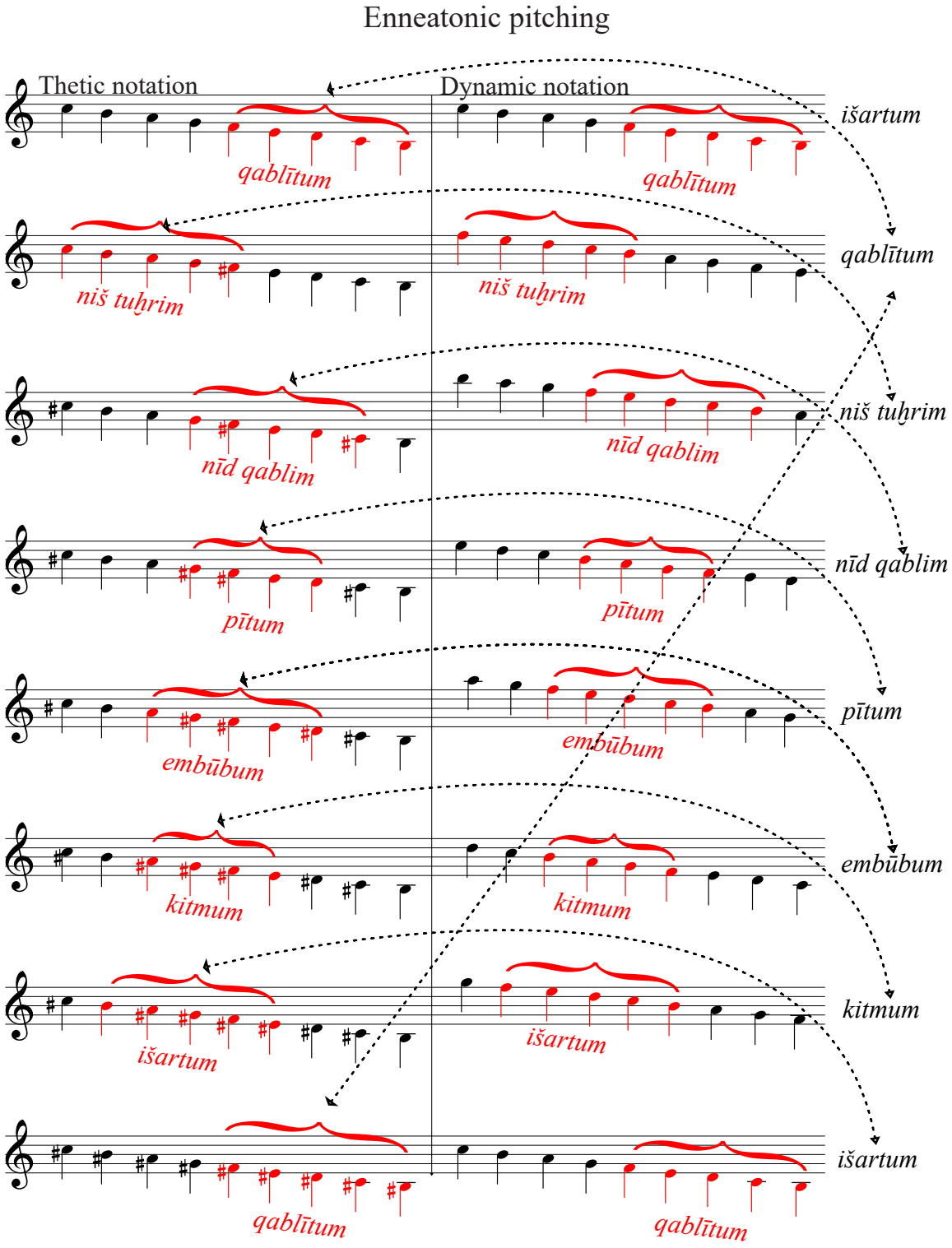


Figure 37. Enneatonic system according to U.7/80.

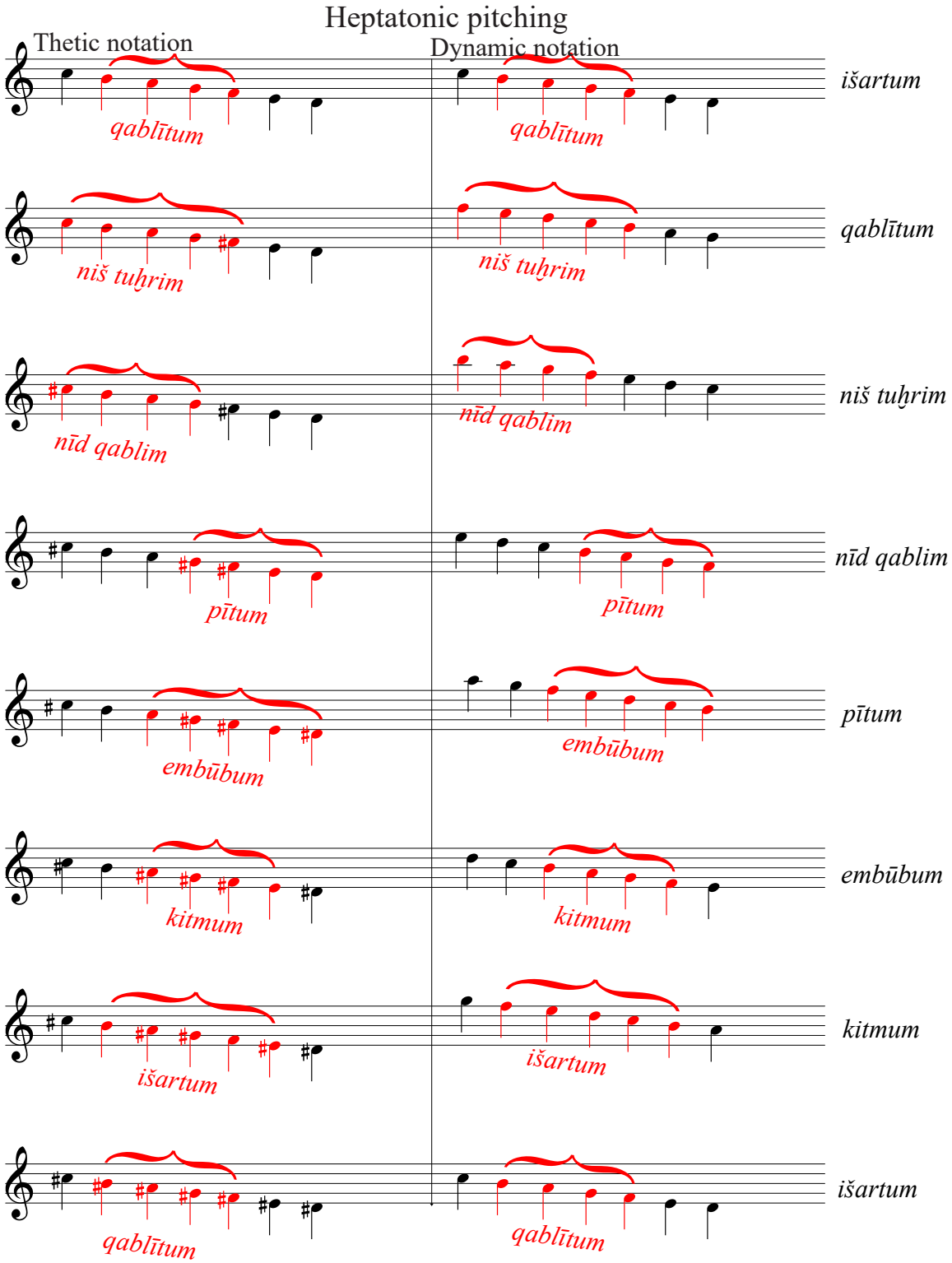



Figure 38. Hypothetical heptatonic system after instructions from U.7/80.

Tridecatonic pitching Thetic notation

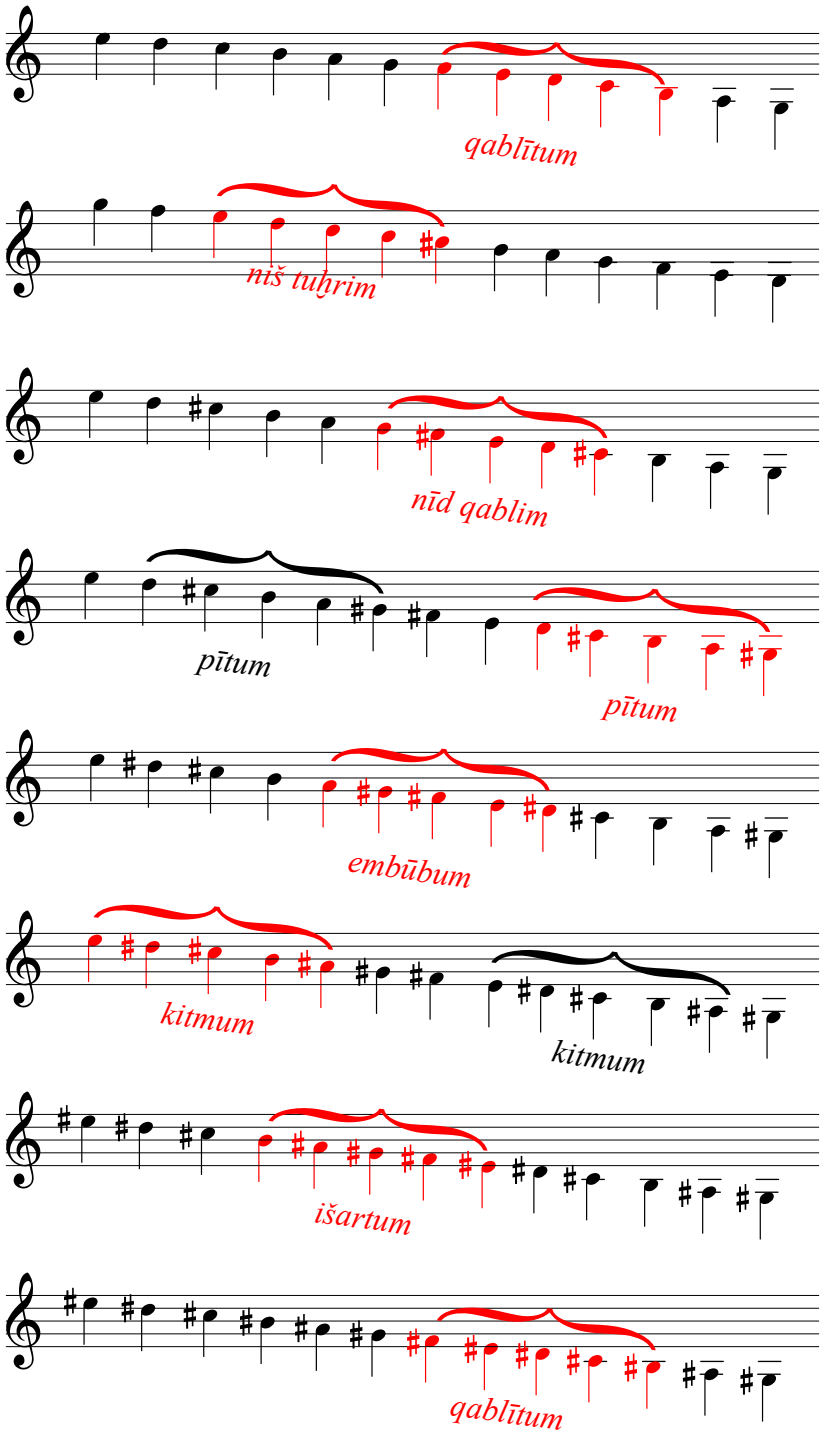


Figure 39. Hypothetical tridecatonic system according to U.7/80. Note that scales 4 and 6 can host 2 unclear/clear intervals.

The first part of U.7/80 listed above in my translation and illustration of U.7/80 clearly shows that Professor Gurney had chosen to 'adapt' the text to match it with CBS 10996. This is a posterioristic method which was probably suggested to him by Kilmer, Duchesne-Guillemin, and later approved by Crocker, and others. I regret to say that this 'adaptation' is deceitful, either by ignorance or by intent. My corrections to Gurney's interpretation is in relation to the tridecatonic system and not to the enneatonic as I contend that this text worked concurrently to my interpretation of CBS 10996.

Had the Babylonians chosen to use a heptatonic system during the Old-Babylonian Period, then they would have adapted U.7/80 to their needs as illustrated above. The last illustration, shows what I would qualify as the original system as it might have been used possibly 500 years or more before the application of U.7/80 as it stands.

It will be further noted that in my interpretations, the intervallic value of the octave does not occur. It might be suggested as one pitch in one fifth and another pitch in a conjoined fifth:

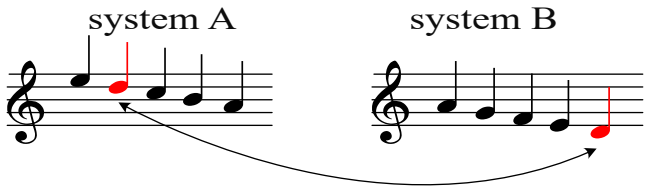


Figure 40. 'd' of system A and 'd' of system B may sound and octave apart but the do not constitute a systemic octave as both 'd' belong to different systems.

This is the reason why some unscrupulous writers have reformulated 'string 1 of the front to string 2 of the back' as string 1 to string 8 in order to create an octave.

Texts U.3011, CBS 10996 and U.7/80 in my revisions, articulate perfectly with one another. For those researcher who have argued that U.7/80 was clear evidence of heptatonism, then why did the Babylonian not use a system of seven pitches, which they could easily have done?

Now, I contend that the instructions given on U.7/80 were never used outside the theoretical scene and therefore were never applied in musical practice. The reason for this hypothesis is simple. While transposing a set to a contiguous set would have been simple enough, for instance from *qablītum* to *niš tuḫrim*

one would only have needed to tune up two Cs to two C sharps, but the tuning from išartum to kitmum would have needed the sharpening of six pitches which would have taken a long time, especially that these instruments would have needed some time to stabilise. I am in favour of the usage of a tridecatonic dynamic tuning which would have allowed for the playing in most pitch sets, or of a smaller ambitus allowing for the playing in few pitch sets depending on the span of the instrument, taking in account, additionally that the melodic span of songs, in Antiquity, might have rarely extended more than a fifth. It is also probable that during a performance, religious or profane, it would be reasonable to assume that a particular specific pitch-set would have been chosen and remained the same throughout the performance. After all was this not the case with the Suite de Dances in the 17th and 18th centuries. Therefore, I am confident that U.7/80 was, after all, a text of theory devised for theoreticians and never for musicians. We must remember that musicians would have been mostly illiterate and that the memorising of the instructions in U.7/80 would not have been straightforward. In the study of ancient texts, when literacy was rare, texts of theory destined to musicians, would have needed to be as simple as possible and this is why my interpretation of CBS 10996 is by far the simplest presentation of the 'Greater Babylonian System' that any musician would have understood without any academic instruction in music theory. I am confident in that CBS 10996, in my interpretation, had been an orally transmitted system before it was inscribed on clay tablets.

The left column

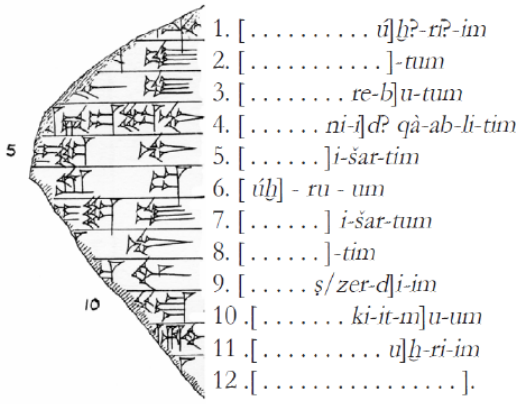


Figure 41. U.7/80, left column.

In the left column of U.7/80, lines 1, 6 and 11 must refer to three rear strings (4, 3 and 2) because the noun uḫru is in the genitive and that only in these three strings *uḫru* can be in the construct state: *ri-bi úḫ-ri-im*; *šal-ši úḫ-ri-im* or *ši-ni úḫ-ri-im*: fourth string 'of the rear'; third string 'of the rear'; second-string 'of the rear'. At line 6, we take úḫ-ru-um as the adjective uḫrû, rather that the noun uḫru, ‘rear’.

The other terms refer to interval names known from CBS 10996. Line 2 has the nominative (*t*)-*um*, and could be either *išartum*, *šalšatum*, *rebūtum* or *qablītum*, with intervals 2-6,8-6,9-7 and 5-9 respectively. Line 3 ending with *b*]*u-tum* could only belong to *rebūtum* 9-7. Line 4, *qà-ab-li-tim* in the genitive implies that it is preceded by *titur* meaning 'bridge'. The intervals could either be 4-8, or 11-9. In line 5 *išartim* could be preceded by *titur* since it is in the genitive, interval 12-10. Line 7 has *išartum* in the nominative, interval 2-6. Line 8 ending with a genitive could either be titur *qablītim* or *titur išartim*, 11-9 or 12-10. The next line, 9 with *-d*]*i-im* could either be 1-5, 4-8 or 11-9. Line 10 with its nominative ending is most likely to be 6-9.

Leaving aside the philological problems raised by the above reconstruction and relying only on musicological logic, we note that the text is made up of quatrains, as is the case with the right column of the same tablet. However, on this column, quatrains are subtitled with pitch-string names arranged in descending fifths, according to our reconstruction.

The quatrain proceed as follows:

1) The first line is a descending melodic fifth.
2) The second line is an ascending melodic third.
3) The third line is an ascending melodic third.
4) The fourth line is a descending melodic fifth.
5) The fifth line is the name/pitch of a string.

These intervals follow a specific pattern:1-5;7-5;12-10;5-9. These represent intervals which are written in full as they are listed in the generative system: 1-5 = *niš tuḫrim*; 7-5 = *šerum*; 12-10 = *titur išartim*; 5-9 = *qablītum*. Follows the subtitle, in this case: ḫamšu ? The next quatrain starts with the last interval

ending the previous one. In this case: 5-9, interval *qablītum*. See full reconstruction below.

1.[.....*ú*]*ḫ-ri-im*	string	5?		= D?
2.[.....*qà-ab-l*[*i-tum*	interval	5-9	b-c-d-e-f	
3.[.....*re-b*]*u-tum*	interval	11-9	g-a-b	
4.[.....*ti-tu-u*]*r qà-ab-li-tim*	interval	9-7	b-c-d	
5.[.....]*i-šar-tim*	interval	2-6	e-f-g-a-b	
6.[*úḫ*]*-ru-um*?	string	1 of rear		= G
7.[.....]*i-šar-tum*	interval	2-6	e-f-g-a-b	
8.[.....*šal-š*[*a-tim*	interval	8-6	c-d-e	
9.[*ṣ/zer-d*]*i-im*	interval	6-4	e-f-g	
10.[...*ki-it-m*]*u-um*	interval	6-10	a-b-c-d-e	
11.[....*ri-bi ú*]*ḫ-ri-im*	string	4 of rear		= C
12.[.....]	interval	6-10		

Figure 42. U.7/80, Interpretation of string and interval positions.

Structural analysis of the system in the left column

As shown above, the system is made up of seven quatrains. We assume that the series started with quatrain 'A' for the reason that it starts with the interval 1-5 = *niš tuḫrim*, followed immediately by *šerum*, as we have it in CBS 10996. It is followed by *titur išartim* and *qablītum*. This generates the following pattern:

l.e	STRING A	*qudmu*	String A
l.f	1-5	*niš tuḫrim*	f-g-a-b-c
l.g	7-5	*šerum*	d-e-f
l.h	12-10	*titur išartim*	f-g-a
l.i	5-9	*qablītum*	b-c-d-e-f
l.1	STRING D	*ḫamšu*	String D
l.2	5-9	*qablītum*	b-c-d-e-f
l.3	11-9	*titur qablītim*	g-a-b
l.4	9-7	*rebūtum*	b-c-d
l.5	9-13 = 2-6	*išartum*	e-f-g-a-b
l.6	STRING G 1 rear	*uḫrum*	String G
l.7	2-6	*išartum*	e-f-g-a-b
l.8	8-6	*šalšatum*	c-d-e
l.9	13-11 = 6-4	*ṣ/zerdum*	e-f-g
l.10	6-10	*kitmum*	a-b-c-d-e
l.11	STRING C	*ribi uḫrim*	String C
l.12	6-10	*kitmum*	a-b-c-d-e
l.13	12-10	*titur išartim*	f-g-a
l.14	10-8	*išqu*	a-b-c
l.15	10-14 = 3-7	*embūbum*	d-e-f-g-a
l.16	STRING E	*šalšu qatnu*	String F
l.17	3-7	*embūbum*	d-e-f-g-a
l.18	9-7	*rebūtum*	b-c-d
l.19	7-5	*šerum*	d-e-f
l.20	7-11	*pītum*	g-a-b-c-d
l.21	STRING B	*šalši uḫrim*	String B
l.22	7-11	*pītum*	g-a-b-c-d
l.23	13-11	*serdû*	e-f-g
l.24	11-9	*titur qablītum*	g-a-b
l.25	4-8	*nīd qablim*	c-d-e-f-g
l.26	STRING E	A.DÙ	String E
l.a	4-8	*nīd qablim*	c-d-e-f-g
l.b	10-8 = 3-1	*isqum*	a-b-c
l.c	8-6	*šalšatum*	c-d-e
l.d	8-12 = 1-5	*niš tuḫrim*	f-g-a-b-c
l.e	STRING A	*qudmu*	String A

Figure 43. Reconstruction of the left column of U.7/80 with intervals and polarities indicated by arrows.

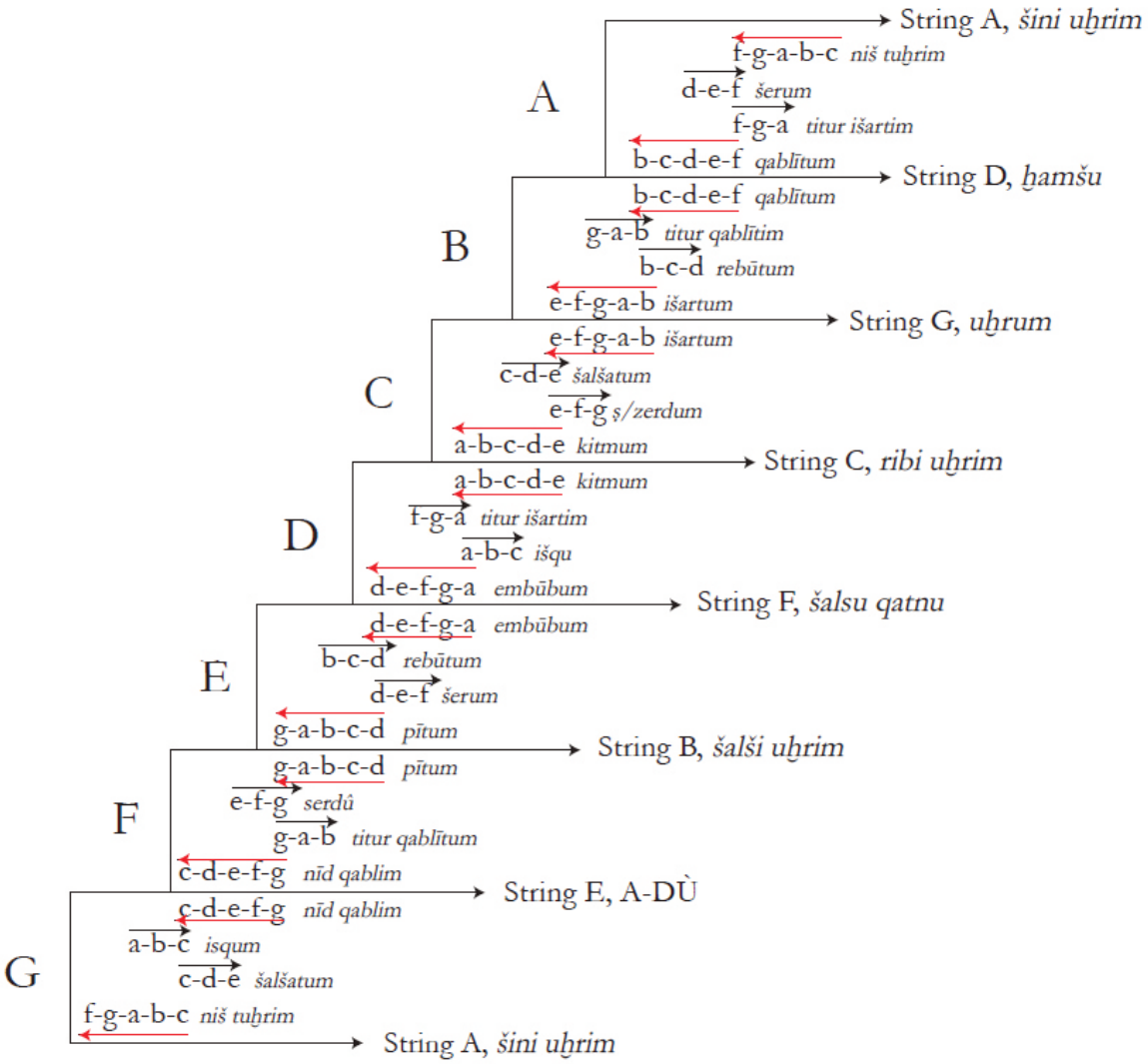


Figure 44. Schematic representation of the left column.

Observation

In our reconstruction,

1) The first quatrain, 'A',

a) Starts with the descending melodic fifth *niš tuḫrim*.

b) It is complemented with the last member of the quatrain, the descending melodic fifth *qablītum*.

c) The conjoining of the two intervals amounts to the set *išartum*.

niš tuḫrim + *qablītum* = *išartum*. (c-b-a-g-f + f-e-d-c-b = c-b-a-g-f-e-d-c-b)

d) The next quatrain starts with the descending melodic fifth *qablītum*.

e) The two inner ascending melodic intervals of the first quatrain are *šerum* and *titur išartim*.

f) When they are conjoined as a-g-f-e-d they form the melodic fifth *embūbum* which ends on 'd' which is the pitch of string *ḫamšu*.

2) The second quatrain, 'B',

a) Starts with the descending melodic fifth *qablītum*.

b) It is complemented with the last member of the quatrain, the descending melodic fifth *išartum*.

c) The conjoining of these intervals amount to the set *qablītum*. *qablītum* + *išartum* = *qablītum*. (f-e-d-c-b + b-a-g-f-e = f-e-d-c-b-a-g-f-e).

d) The next quatrain starts with the descending melodic fifth *išartum*.

e) The two inner melodic intervals of the second quatrain are titur *qablītum* and *rebūtum*.

f) When they are conjoined (d-c-b-a-g) they form the descending melodic fifth *pītum* which ends on 'g' which is the pitch of string *uḫrum*.

The next quatrains follow the same pattern. The last descending melodic fifth of the last quatrain is also the first descending melodic fifth of the first quatrain.

Therefore, this system consisted of a series of seven melodic enneatonic sets.

From the above observations, we can lay the following rules:

I The first and fourth descending fifths of a quatrain conjoin into a set. (This subset is also - significantly - the first one cited in the first quatrain of the right column of U.7/80).

II The last descending fifth of a quatrain is taken as the first descending fifth of the quatrain which follows.

III The two inner ascending melodic thirds amount to a descending fifth the last pitch of which being the name of the string listed after each quatrain.

Conclusion

I do not see any purpose for this series of quatrains other than they appear to be a form of classification. However, it confirms that descending melodic enneads are made of conjoined descending melodic fifths. Descending melodic fifths are made of conjoined ascending melodic thirds.

N 4782

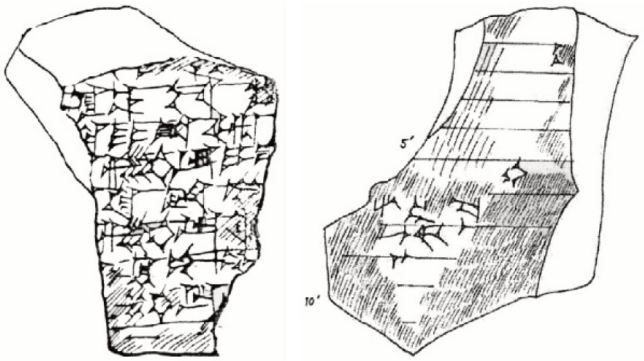


Figure 45. Hand copies of N 4782, left, Rev. by Shaffer. Obv., right by Miguel Civil.

In November 1977 Aaron Shaffer found a small fragment in the University Museum collection in Philadelphia, which he believed complemented UET VII 126. It was published in 1981.

Obverse

Line	Sumerian column	Akkadian column
1’ (i8)	[x x x x]	*š*[*i*]-*n*[*i*] *ú*[*ḫ-re-em*]
2’ (i9)	[x x x x].**la**	*úḫ-ru*-[*um*]
3’ (i12)	[x x].**sa** 2	*i-ša-ar*-[*tum*]
4’ (i13)	[x x x x x]	*sí-ḫi-ip i-š*[*a-ar-ti-im*]
5’ (i14)	[x x x x x]	*ki-it-mu*-[*um*]
6’ (i15)	[x x x x x]	*sí-ḫi-ip ki-i*[*t-mi-im*]
7’ (i16)	[x x x x x]	*en-bu-bu*-[*um*]
8’ (i17)	[x x x x x	*s*]*í-ḫ-ip e*[*n-bu-bi-im*]

Reverse

Line	Sumerian column	Akkadian column
1’- 4’ broken or undeciphered traces		
5’	[x x x x	x x x] a [xx]
6’	[x x x x	x x x x] *ḫi*-x [x]
7’	[x x x x	x x x x x x]
8’	[x x **giš al**].**gar**	x x[x x x]
9’	[x x x	x]x *ti*-x-[x x x]
10’	[x x x x]x	[x x x x x]
rest broken		

Figure 46. Transliteration of N 4782

UET VII 126, Obv. Col.I & 2, N.B. + N 4782, Obv. O.B.?

1. **sa.di**	*qud-mu-u*[*um*]	[**sa.di**	*qud-mu-u-um*]
2. **sa.uš**	*šá-mu-šu-um*	[**sa.uš**	*šá-mu-šu-um*]
3. **sa.3.sa.sig**	*ša-al-šu qa-a*[*t-nu*]	[**sa.3.sa.sig**	*ša-al-šu qa-at-nu*]
4. **sa.4.tur**	*a-ba-nu-*[*ú*]	[**sa.4.tur**	*a-ba-nu-ú*]
5. **sa.di*5**	*ḫa-am-*[*šu*]	[**sa.di*5**	*ḫa-am-šu*]
6. **sa.4.a.ga.gul**	*ri-bi úḫ-ri-i*[*m*]	[**sa.4.a.ga.gul**	*ri-bi úḫ-ri-im*]
7. **sa.3.a.ga.gul**	*šal-ši úḫ-ri-rim*	[**sa.3.a.ga.gul**	*šal-ši úḫ-ri-rim*]
8. **sa.2.a.ga.gul**	*ši-ni úḫ-ri-im*	1’ [**sa.2.a.ga.gul**]	*ši-ni ú*[*ḫ-ri-im*]
9. [**sa.1**]**a.ga.gul.la**	*úḫ-ru-um*	2’ [**sa.1.**]**a.ga.gul**].**la**	*úḫ-ru-um*
10. [**9**]**sa.a**	9 *pi-it-nu*		
11. [**sa.**]**du.a**!	*pi-is-mu*		
12. [**sa. si.s**]**á**	*i-šar-ti*	3’ [**sa.si**].**sá**	*i-ša-ar-*[*tum*]
13. [**sa.x si.sá**]	[*s*]*i-ḫ-ip i-šar-tum*	4’ [**sa.x sa.s**]**á**	*si-ḫi-ip i-š*[*a-ar-tim*]
14. [**sa.šu**?]	[*ki-i*]*t-mu*	5’ [**sa.š**]**u**?	*ki-it-mu-*[*um*]
15. [**sa.x šu**?]	[*si-ḫi-ip k*]*i-it-mu*	6’ [**sa.x š**]**ú**?	*si-ḫi-ip ki-*[*it-mi-im*]
16. [**sa.gi.gíd**]	[*em-bu-bu*]*-um*	7’ [**sa.gi.g**]**íd**	*em-bu-bu-*[*um*]
17. [**sa.x.gi.gíd**]	[*si-ḫi-ip em-bu-bu-u*]*m*	8’ [**sa.x.gi.gíd**]	*si-ḫi-ip e*[*n-bu-bi-im*]
18. [**sa.x**]	[*pi-tum*]	9’ [**sa.x**]	[*p*]*i-*[*tum*]
19. [**sa.x y**]	[*siḫip pitim*]	10’ [**sa.x y**]	[*siḫip pitim*]
20. [**sa.šub.murub**$_4$]	[*nīd qablim*]	11’ [**sa.šub.murub**$_4$]	[*nīd qablim*]
21. [**sa.x.šub.murub**$_4$]	[*siḫip nīd qablim*]	12’ [**sa.x.šub.murub**$_4$]	[*siḫip nīd qablim*]
22. [**sa.x.gaba.ri**]	[*niš tuḫrim*]	13’ [**sa.x.y.gaba.ri**]	[*nīš tuḫrim*]
23. [**sa.x.y.gaba.ri**]	[*siḫip niš tuḫrim*]	14’ [**sa.x.y.gaba.ri**]	[*siḫip nīš tuḫrim*]
24. [**sa.x.murub**$_4$]	[*qablītum*]	15’ [**sa.x.murub**$_4$]	[*qablītum*]
25. [**sa.x.y.murub**$_4$]	[*siḫip qablītum*]	16’ [**sa.x.y.murub**$_4$]	[*siḫip qablītim*]

Figure 47. Transliteration of UET 126, Obv. Col. I and II, N.B. + N 4782, Obv., O.B.?

N 4782 is certainly a fragment which is the continuation of *nabnītu* xxxii, from another copy of the text. It would be a second ‘chapter’, as after having listed the nine string-pitches of the system, the text continues with line 11. (Sumerian)[**sa**.]**du.a**! (Akkadian) *pi-is-mu*, as a header. But what is the meaning of pismu? The CAD is inconclusive as it says nothing more than we already know. An enlightened guess, on the basis of our interpretation of lines 12 (= 3’),

to 25 (=16') is that pismu would be the term for 'melodic fifth', and that with regard *siḫip*, *siḫpum* would be a nominal derivative of *saḫapum*, 'to throw to the ground'. However, for reasons that will become obvious during the process of our explanations, we would translate the verb saḫapum not as 'to throw to the ground', but 'to sub-place' the designated melodic fifth at the beginning of the next subset. As we explained before, an enneatonic set is made up of two conjoined melodic fifths and we believe that lines 12 (= 3'), to 25 (=16') give the name of the second fifth of a set, and secondly the instruction (*siḫip*) to replace it at the beginning of the next set where it is followed by a second fifth, thus creating a new set, and so forth. Therefore these lines explain the formation of enneatonic sets and confirm that each is made up of two conjoined melodic fifths. Before explaining the process, let us be reminded of the structure of the sets:

Fifths *nīš tuḫrim* + *qablītum*	= pitch set of *išartum*	= c-b-a-g-f-e-d-c-b
Fifths *qablītum* + *išartum*	= pitch set of *qablītum*	= f-e-d-c-b-a-g-f-e
Fifths *išartum* + *kitmum*	= pitch set of *nīš tuḫrim*	= b-a-g-f-e-d-c-b-a
Fifths *kitmum* + *embūbum*	= pitch set of *nīd qablim*	= e-d-c-b-a-g-f-e-d
Fifths *embūbum* + *pītum*	= pitch set of *pītum*	= a-g-f-e-d-c-b-a-g
Fifths *pītum* + *nīd qablim*	= pitch set of *embūbum*	= d-c-b-a-g-f-e-d-c
Fifths *nīd qablim* + *nīš tuḫrim*	= pitch set of *kitmum*	= g-f-e-d-c-b-a-g-f

and lines 3' to 16' of N 4782

Line.12	*išartum*
Line.13	*siḫip išartim*
Line.14	*kitmum*
Line.15	*siḫip kitmim*
Line.16	*embūbum*
Line.17	*siḫip embūbim*
Line.18	*pītum*
Line.19	*siḫip pītim*
Line. 20	*nīd qablim*
Line. 21	*siḫip nīd qablim*
Line. 22	*nīš tuḫrim*
Line. 23	*siḫip nīš tuḫrim*
Line. 24	*qablītum*
Line. 25	*siḫip qablītim*

Explanation of the process from lines 3 to 16 of N 4782:

išartum (fifth)	f-e-d-c-**b-a-g-f-e**	(*qablītum*)
siḫip išartim (move *išartum* to the front)	**b-a-g-f-e**-d-c-g-a	(*nīš tuḫrim*)
kitmum (fifth)	b-a-g-f-**e-d-c-g-a**	(*nīš tuḫrim*)
siḫip kitmim (move *kitmum* to the front)	**e-d-c-g-a**-g-f-e-d	(*nīd qablim*)
embūbum (fifth)	e-d-c-g-**a-g-f-e-d**	*nīd qablim*)
siḫip embūbim (move *embūbum* to the front)	**a-g-f-e-d**-c-b-a-g	(*pitum*)
pitum (fifth)	a-g-f-e-**d-c-b-a-g**	(*pitum*)
siḫip pitim (move *pitum* to the front)	**d-c-b-a-g**-f-e-d-c	(*embūbum*)
nīd qablim (fifth)	d-c-b-a-**g-f-e-d-c**	(*embūbum*)
siḫip nīd qablim (move *nīd qablim* to the front)	**g-f-e-d-c**-b-a-g-f	(*kitmum*)
nīš tuḫrim (fifth)	g-f-e-d-**c-b-a-g-f**	(*kitmum*)
siḫip nīš tuḫrim (move *nīš tuḫrim* to the front)	**c-b-a-g-f**-e-d-c-b	(*išartum*)
qablītum (fifth)	c-b-a-g-**f-e-d-c-b**	(*išartum*)
siḫip qablītim (move *qablītum* to the front)	**f-e-d-c-b**-a-g-f-e	(*qablītum*)

The table above explains the instructions in lines 3 to 16. The term *siḫip* unequivocally indicates the shift of the second fifth of a set to the position (in red above) of the first fifth in the next set, and so forth. This further proves that the sets are made up of two conjoined fifths amounting to an enneatonic set. It is also proposed that the term '*pismu*' means 'melodic fifth', to distinguish it from the enneatonic set of the same name.

Quantification

Universalists would conclude from the aforementioned texts that Babylonian music was diatonic, ditonic and heptatonic, or what was called, much later, the Pythagorean system. While this is true for the theory in text CBS 1766, as the evidence is proven, because the tuning described in this prescriptive text is unequivocally based on a series of descending fifths and ascending fourths until the seventh pitch:

b 702 c. e
a 498 c. d
g 702 c. c
f

b→a = 204 c.
a→g = 204 c.
g→f = 204 c.
f→e = 90 c.
e→d = 204 c.
d→c = 204 c.
c→b = 90 c.

Figure 48. Calculation of intervals as described in CBS 1766 and resulting pitch set.

scale of	b	204	a	204	g	204	f	90	e	204	d	204	c	90	b
scale of	a	204	g	204	f	90	e	204	d	204	c	90	b	204	a
scale of	g	204	f	90	e	204	d	204	c	90	b	204	a	204	g
scale of	f	90	e	204	d	204	c	90	b	204	a	204	g	204	f
scale of	e	204	d	204	c	90	b	204	a	204	g	204	f	90	e
scale of	d	204	c	90	b	204	a	204	g	204	f	90	e	204	d
scale of	c	90	b	204	a	204	g	204	f	90	e	204	d	204	c

Figure 49. Table of heptatonic diatonic ditonic scales calculated from CBS 1766

The figures above produce the following pitch set:

b-1200 cents	=	2/1, octave;
a-996 cents	=	16/9, minor seventh;
g-792 cents	=	128/81, minor sixth;
f-588 cents	=	unclassified. Nearest = 590 = 45/32, false tritone;
e-498 cents	=	4/3, just fourth;
d-294 cents	=	32/27, minor third;
c-90 cents	=	256/243, limma.
b-0 cents	=	1/1

Figure 50. Denomination of the pitches from the instructions in CBS 1766

It would be presumptuous to say that older texts of the corpus were tuned in the same manner as there is neither evidence, nor proof to uphold the evidence.

Most writers having written about text U.7/80 have concluded that the Babylonian term *la zaku*, which roughly translates as ‘unclear’, unequivocally meant ‘tritone’ = 612 cents and that *iz-zaku* meant that this tritone was corrected to consonance, i.e., ‘just’ that is a just fourth or a just fifth. Therefore, according to them, when instructions in the quatrains of the first part said that a specific string should be tensioned, it was by a Pythagorean semitone, and when instructions in the the second part said that specific strings should be relaxed, it was also by a Pythagorean semitone. However, 612 + 90 = 702, a just fifth, but 612 - 90 = 522, which is an acute fourth + 2 cents. Therefore the denomination *la zaku* for the tritone at 612 cents is incorrect.

Text U.3011 hold essential clues about another type of pitch quantification. I will therefore give an explanation about what I call the chronological layers of the text, or its systemic stratigraphy as shown on the next pages.

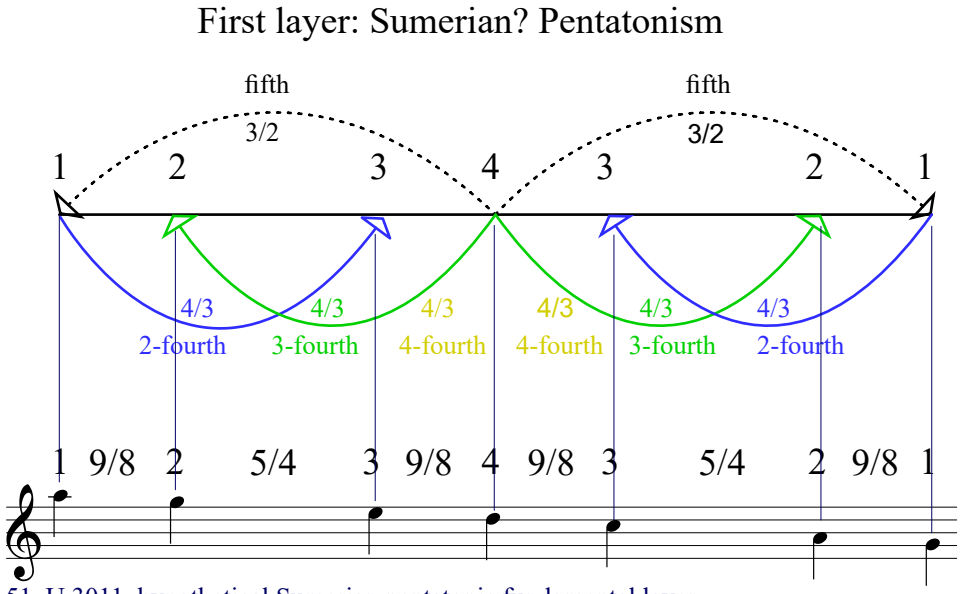

First layer: Sumerian? Pentatonism
fifth
3/2
fifth
3/2
1 2 3 4 3 2 1
4/3 4/3 4/3 4/3 4/3 4/3
2-fourth 3-fourth 4-fourth 4-fourth 3-fourth 2-fourth
1 9/8 2 5/4 3 9/8 4 9/8 3 5/4 2 9/8 1

Figure 51. U.3011, hypothetical Sumerian pentatonic fundamental layer.

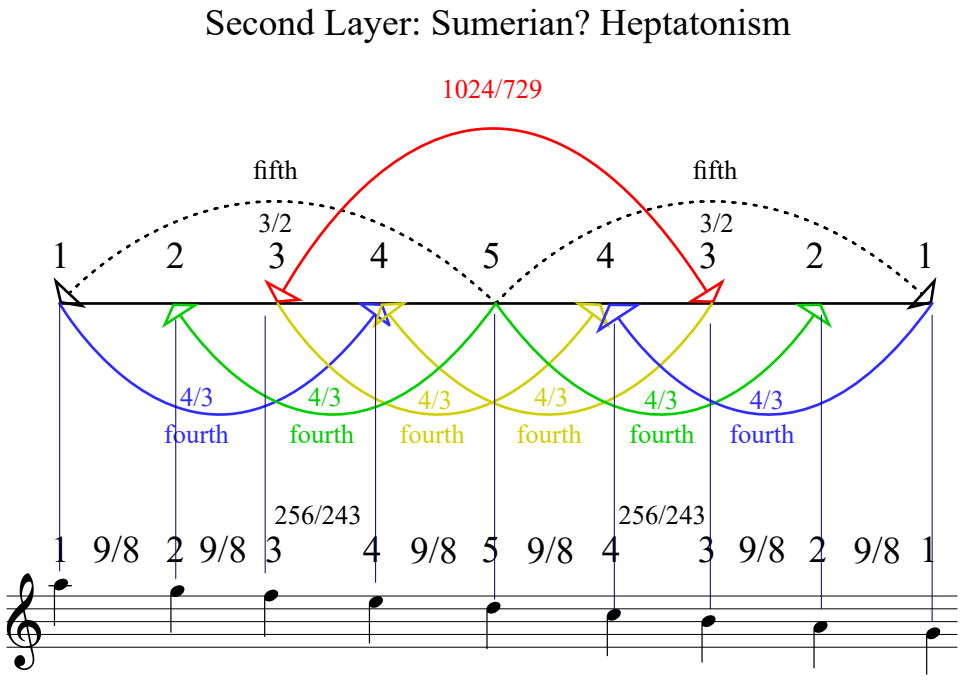

Second Layer: Sumerian? Heptatonism
1024/729
fifth
3/2
fifth
3/2
1 2 3 4 5 4 3 2 1
4/3 4/3 4/3 4/3 4/3 4/3
fourth fourth fourth fourth fourth fourth
256/243 256/243
1 9/8 2 9/8 3 4 9/8 5 9/8 4 3 9/8 2 9/8 1

Figure 52. U.3011, hypothetical second Sumerian heptatonic layer.

Third Layer: Sumerian? Heptatonism with fourth small string and third thin string

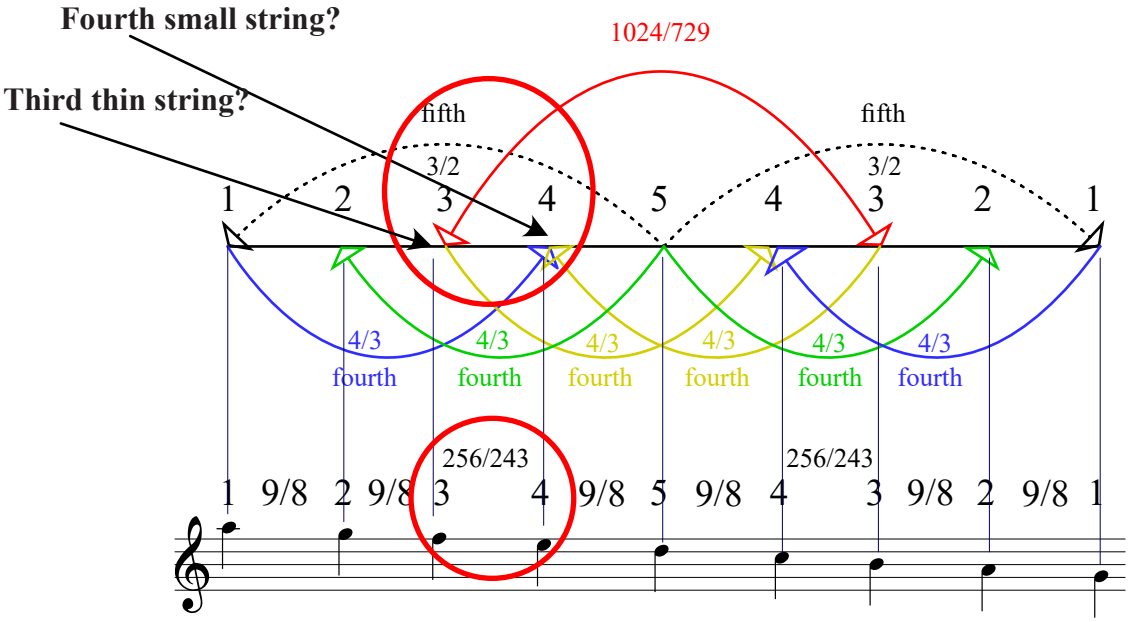


Figure 53. U.3011, hypothetical second Sumerian heptatonic layer with variations.

Fourth Layer: Neo-Babylonian with Nippurian quantification

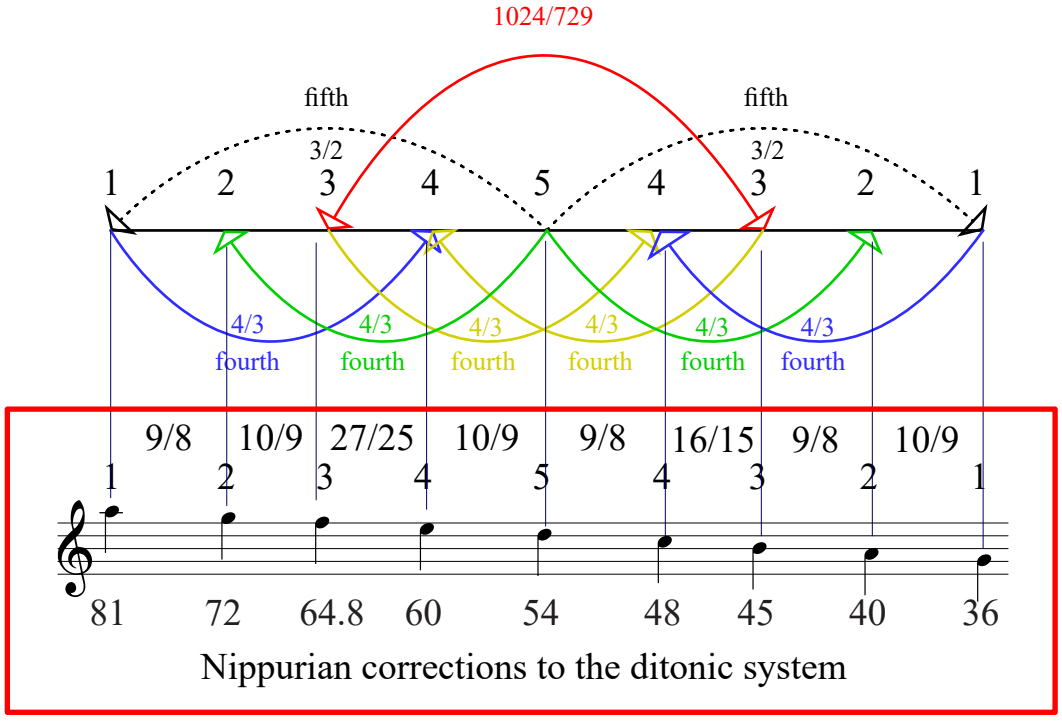


Figure 54. U.3011, Nippurian quantification, ca. 2300 BC.

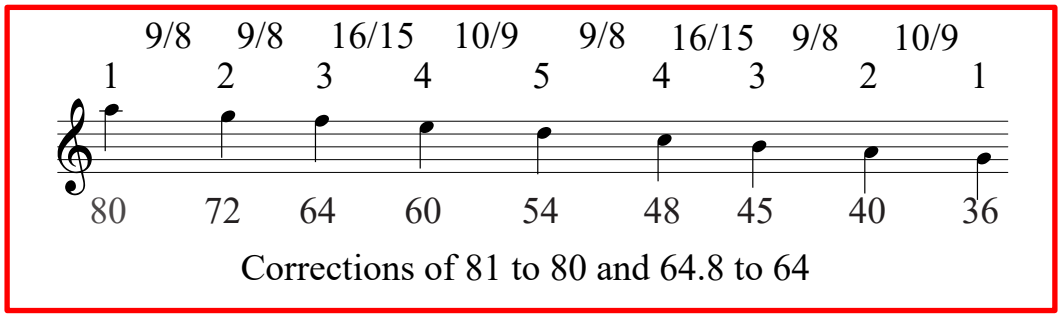


Figure 55. reformation of the Nippurian system. Top, frequency ratios, U.3011 numbering; bottom regular numbers.

In order to explain the Nippurian quantification, it is appropriate to examine the four mathematical texts from the Temple Library of Nippur.

The four cuneiform texts discussed here were originally published by Hilprecht in his twentieth volume of the Babylonian Expedition of the University of Pennsylvania, in 1906.

The texts were excavated at the temple library of Nippur and were part of about 7000 texts and fragments.

Hilprecht did not understand the reasons for the lists of numbers mainly for the reason that in the early twentieth century, texts of theory, such as U.7/80; CBS 1766 and CBS 10996, had not yet been satisfactorily understood. He did not understand why out of 81 in the list, 51 were missing leaving 30 numbers and that these remaining numbers were exactly the numbers of part of the harmonic series, between 81 and 36: 81; 72; 64(.8); 60; 54; 48; 45; 40 and 36, or 810; 720; 648; 600; 540; 480; 450; 400 and 360.

As judiciously observed, Hilprecht noted that the four tablets shared three particular features:

1. When several multiplication tables are written together, the highest number begins the series, 81 in this case.

2. The numbers multiplied are not consecutive, but are often separated from each other by comparatively large intervals.

3. Besides 3 and 5, no indivisible number or its multiple is multiplied. Note the absence of 7; 11; 13; 14; 17; 19; 21; 22; 23; 26; 28; 29; 31; 33; 34; 35; 37; 38; 39; 41; 42; 43; 44; 46; 47; 49; 51; 52; 53; 55; 56; 57; 58; 59; 61; 62; 63; 65; 66; 67; 68; 69; 70; 71; 73; 74; 75; 76; 77; 78 and 79.

Out of 81 numbers, 51 are omitted leaving 29 numbers:

1-2-3-4-5-6-8-9-10-12-15-16-18-20-24-27-30-32-**36-40-45-48-50-54-60-64-72-80-81**

The adaptation to the enneachord in U.3011 to the Nippurian regular numbers or Nippurian pitch quantification was simple enough.

First, it consisted in taking the text U.3011 in its ditonic structure and replace the values in cents of the pitches, and the correcting the numbers 81 to 80 and 64.8 to 64 as shown below.

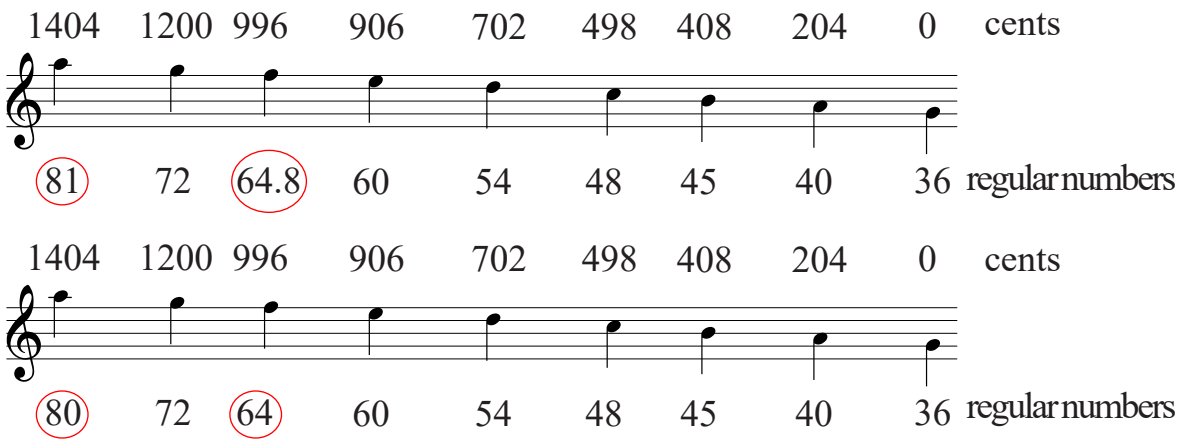


Figure 56. top stave with ditonic quantification in musical cents and Nippurian quantification. Bottom stave, ditonic quantification and emendated Nippurian quantification.

c		b		a		g		f		e		d		c		b		a		g		f		e
960		900		810		720		648		600		540		480		450		400		360		324		300
	112		182		204		182		133		182		204		112		204		182		182		133	
	16/15		10/9		9/8		10/9		25/27		10/9		9/8		16/15		9/8		10/9		10/9		27/25	

c		b		a		g		f		e		d		c		b		a		g		f		e
960		900		800		720		640		600		540		480		450		400		360		324		300
	112		204		182		204		112		182		204		112		204		182		182		133	
	16/15		9/8		10/9		9/8		16/15		10/9		9/8		16/15		9/8		10/9		10/9		27/25	

Figure 57. Upper part of the table giving Nippurian quantification below the pitches, the values in cents of the intervals and their ratios of frequencies. The lower table gives the emendated quantification.

It is difficult to say which of the original or emendated tricadecatonic set was used. They sound very similar, but I would say with an educated guess that it was the set which offered the most differences in the quality of both primary (ascending consecutive thirds), and secondary (descending consecutive fifths) as we shall investigate now.

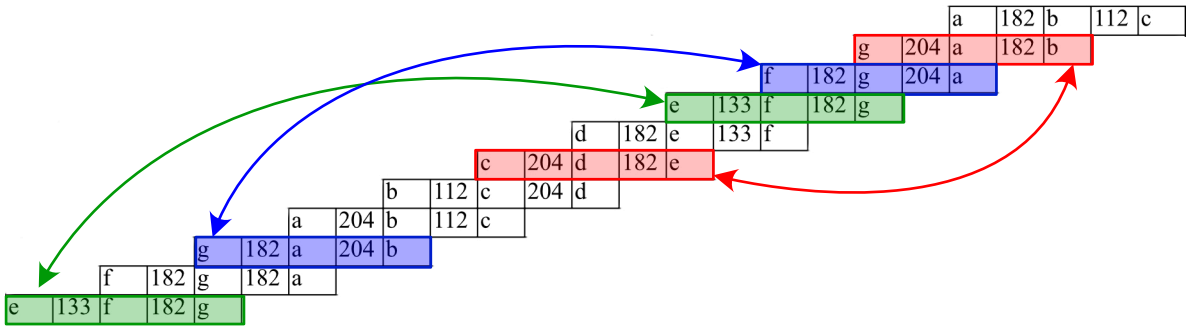


Figure 58. Series of ascending consecutive thirds in the Nippurian original quantification. (81-64.8)

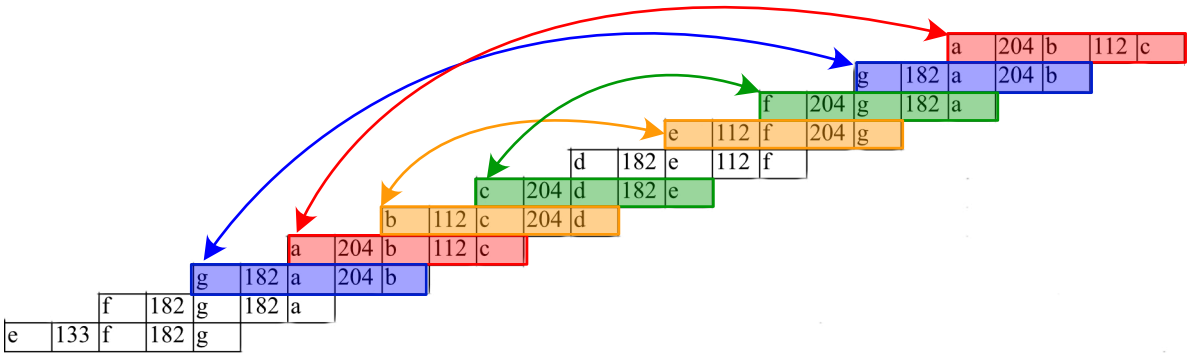


Figure 59. Series of ascending consecutive thirds in the reformed Nippurian quantification. (80-64)

c	112	b	182	a	204	g	182	f	*niš tuḫrim*																							
		b	182	a	204	g	182	f	133	e	*išartum*																					
				a	204	g	182	f	133	e	182	d	*embūbum*																			
						g	182	f	133	e	182	d	204	c	*nīd qablim*																
								f	133	e	182	d	204	c	112	b	*qablītum*														
										e	182	d	204	c	112	b	204	a	*kitmum*											
												d	204	c	112	b	204	a	182	g	*pitu*									
														niš tuḫrim ?	c	112	b	204	a	182	g	182	f							
																	išartum ?	b	204	a	182	g	182	f	133	e					

c	112	b	204	a	182	g	204	f	*niš tuḫrim*																							
		b	204	a	182	g	204	f	112	e	*išartum*																					
				a	182	g	204	f	112	e	182	d	*embūbum*																			
						g	204	f	112	e	182	d	204	c	*nīd qablim*																
								f	112	e	182	d	204	c	112	b	*qablītum*														
										e	182	d	204	c	112	b	204	a	*kitmum*											
												d	204	c	112	b	204	a	182	g	*pitu*									
														niš tuḫrim ?	c	112	b	204	a	182	g	182	f							
																	išartum ?	b	204	a	182	g	182	f	133	e					

Figure 60. top table, descending simultaneous fifths showing that each of the nine fifth has a similar structure whether with 81 and 64.8 or with 80 and 64. This proves the reason for having a different name for each of them as given with CBS 10996. The figure above shows that some of the intervals of ascending thirds are repeated, some because of octaval relationship and other simply because of the limited number of specific intervals.

Conclusion to the texts of theory

One thing is certain: this mass of sophisticated theory was not inscribed on clay tablets for the purpose of the musician. Indeed, most, if not all of them were illiterate with the exception of a certain King Shulgi who in a self-laudatory hymn writes:

> I, Shulgi, king of Urim, have also devoted myself to the art of music. Nothing is too complicated for me; I know the full extent of the tigi and the adab, the perfection of the art of music. When I set the frets on the lute, which enraptures my heart, I never damage its neck; I have devised rules for raising and lowering its intervals. On the gu-uš lyre I know the melodious tuning. I am familiar with the sa-eš and with drumming on its musical soundbox. I can take in my hands the miritum, which ..... I know the finger technique of the algar and sabitum, royal creations. In the same way I can produce sounds from the urzababitum, the harhar, the zanaru, the ur-gula and the dim-lu-magura. Even if they bring to me, as one might to a skilled musician, a musical instrument that I have not played previously, when I strike it up I make its true sound known; I am able to handle it just like something that has been in my hands before. Tuning, stringing, un-stringing and fastening are not beyond my skills. I do not make the reed pipe sound like a rustic pipe, and on my own initiative I can wail a sumunca or make a lament as well as anyone who does it regularly.

The subtle variations in the complex tunings I have demonstrated would have been far too minute for their application onto the instruments crafted, with great art it is certain, but fitted with tuning devices of limited accuracy which would have been unable to hold these tunings satisfactorily. Texts of theory would have only been written for the satisfaction of the theoreticians and sometimes on the ruler's demand - for which musicians had no time. It is highly probable that music praxis and theory were safely kept apart. However, this does not mean that the theory was distinct from the practice but that it might have diverged from it depending on stylistic variations in various regions of the Empire in the same way the same tune, in Western Mediæval times, would have varied according to intonation customs where it was performed.

There are other texts which include some theory. I did not include them in the present volume for the reason either that they are incomplete or obscure.

The only two texts which might have come from musicians themselves would be U.3011, but more so my reconstruction of CBS 10996 as it certainly reveals a method with which musicians could learn the values of their intervals by means of short incipits each having their different tonal arrangement as today with the ajnas of Arabic music which serve the same purpose.

The last part of this book is about the Hurrian text H.6 since its musical reconstruction can only be undertaken with my interpretation of the texts of theory in this volume.

HURRIAN TEXT H.6

(RŠ13.30 + 15.49 + 17.387)

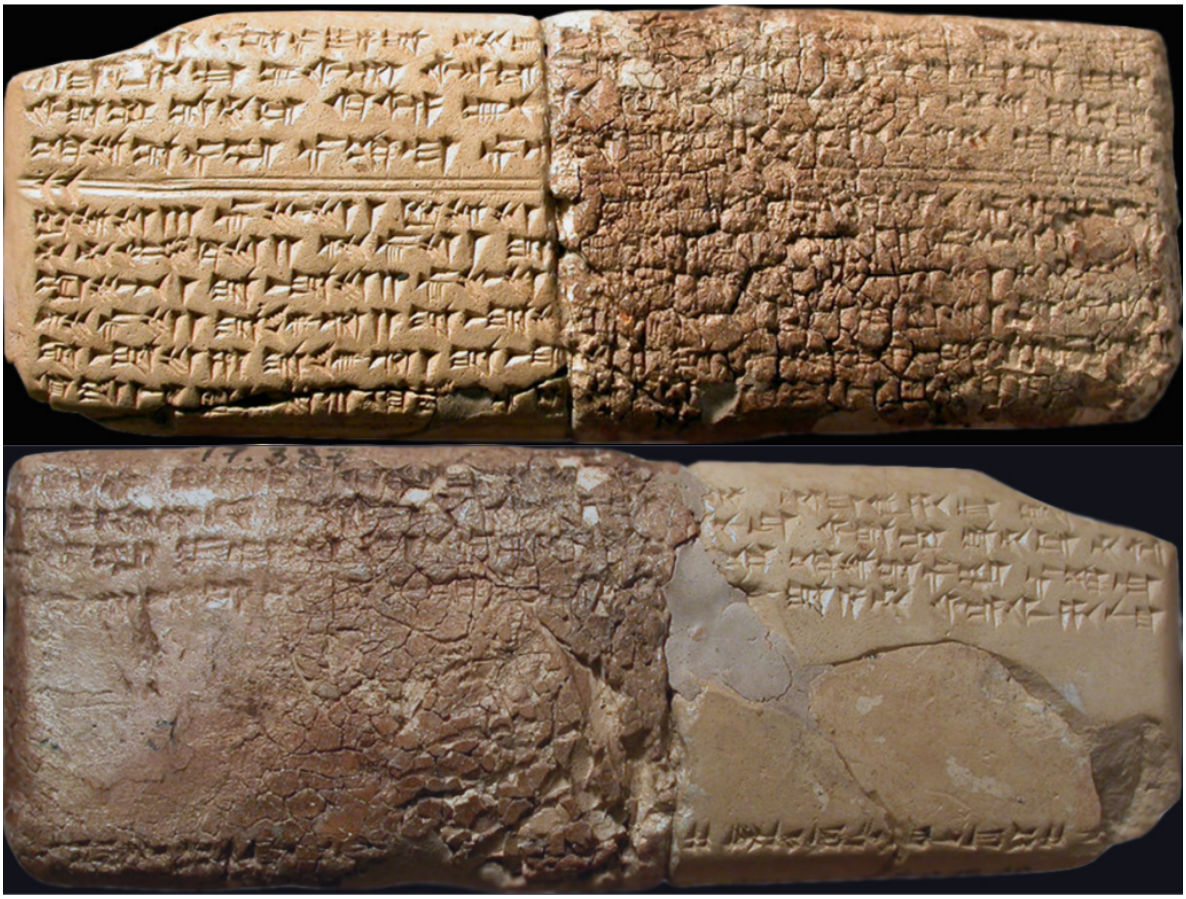


Figure. 61. Tablet H6 = (RŠ13.30 + 15.49 + 17.387), Obverse and Reverse. This tablet is hosted at the National Museum of Damascus.

Introduction

At the very beginning of the exploration at Ras-Shamra, an important clay tablet was unearthed. It was a bilingual text, Hurrian and Babylonian of the 14th century BC, proving the practice of the Hurrian language at Ugarit. It was published by Thureau-Dangin in *Syria*, 12 (1931). The following pre-war seasons brought up three Hurrian fragments and the two last seasons of 1950 and 1951 brought up two new texts, notably, H.6.

Then H.G. Güterbock (*RA 64*, 45 ff.) and H.M. Kümmel (*Orientalia 39*, 263) claimed having understood the nature of the music in these texts which they qualified as ‘hymns sung to the accompaniment of (a) musical instrument(s)’.

Kilmerian interference

Then Kilmer threw a spanner in the works with her dogmatic dichordal hypothesis although the colophon does not say that the music had to be sung to the accompaniment of any instrument. However, Kilmer had to justify her dichordal hypothesis. Since the voice cannot sing dichords, her enforcement that there was accompaniment was her manner of solving the problem that her dichords would have encountered should the song be intended a cappella, and most agreed with her. There was some strong opposition, notably by Madame Duchesne-Guillemin, David Wulstan, Bo Lawergren and myself among others. Regardless, she stood deaf and blind to our objections.

Philological evidence

Now, the colophon of No. 6 reads as follows:

[*an-nu*]-*ú za-am-ma-aš-ša ni-it-kib-li za*-[*lu-zi* about 7 signs]X SU ^{m}*Am-mu-ra-bi*

The demonstrative *annu*-, 'this, that' had already been elucidated by Speiser with the Mitanian *ani*-/*anu*-. Güterbock improved **za-am-ma-aš-ša* with *za-am-ma-rù ša* 'song of ...'; see the beginning of colophon 19.164 rev. 4: *za*-[*ma*]-*ru* [*ša* ....]. With *azzamira*, the commitative of *azammi*- should be rejected and must be a form of *zamāru* 'to sing'.

So, if the verb *zamāru* is according to the CAD a song, a literary composition to be sung <u>with</u> or <u>without</u> accompaniment, it is not necessarily <u>with</u> accompaniment as Kilmer wishes it should be. Whenever instruments are intended, they are mentioned: [X] *za-ma-ru a-da-pu*.MEŠ = songs for the *adapu*-instruments; *za-ma-rum šá pít-ni* = to sing (to the accompaniment of) a *pitnu* instrument A VIII/2:13. In H.6 and in the other texts of the H collection there is no mention of any instrument. Therefore the Kilmerian dichordal hypothesis must be eliminated once and for all. The substantive *zamāru* should be better translated as 'melody' which can either be sung or played solo or to the accompaniment of an instrument or more than one instrument but that in all cases when the song has an accompaniment, the instrument or the instruments are mentioned. The same applies to the verb *zamāru* which should not in any case mean instrumental accompaniment by default.

We shall only discuss music notation since the lyrics are a matter of philology which is not of the competence of the present work. The colophon says that the song is in the pitch set of *nid kibli*. The nature of this set has been elucidated from three texts: my reconstruction of the forerunner of CBS 10996, *nabnitu* xxxii, and U.7/80, already discussed in the present work. *ni-id-kib-li* (Hurrian), *nīd qablim* (Babylonian) is an enneatonic descending pitch set: e-d-c-b-a-g-f-e-d. Values for melodic fifths and thirds are known from the aforementioned texts.

The interpretation is a straight forward operation. The music part of the tablet is composed of the names of melodic thirds and fifths and of numbers following each of them:

Line 5. [*qablite* 3] [*irbute* 1] [*qablite* 3] [*šaḫri* 1] [*titimišarte* 10] *uštamari*.....??
Line 6. [*titimišarte* 2] [*zirte* 1] [*šaḫri* 2] [*šaššate* 2] [*irbute* 3] [*šaššate* 2]
Line 7. [*umbube* 1] [*šaššate* 2] [*irbute* 2] [*nadqabli* 1] [*titur qablite* 1] [*titimišarte* 2]
Line 8. [*zirte* 1] [*šaḫri* 2] [*šaššate* 4] [*irbute* 1] [*nadqabli* 1] [*šaḫri* 2]
Line 9. [*šaššate* 2] [*šaḫri* 1] [*šaššate* 2] [*šaḫri* 1] [*šaššate* 2] [*irbute* 4]
Line 10. [*kitme* 2] [*qablite* 3] [*kitme* 1] [*qablite* 2] [*kitme* 1] [*qablite* 3]

Some numeric values could not be clearly read because of the damage to the tablet.

The melodic value for the melodic thirds and fifths in H6 is:

umbube = c-b-a-g-f; *nadqabli* = b-a-g-f-e; *qablite* = a-g-f-e-d; *kitme* = g-f-e-d-c; *titur qablite* = b-c-d; *titimisarte* = a-b-c; *zirte* = g-a-b; *šaḫri* = f-g-a; *šaššate* = e-f-g; *irbute* = d-e-f.

With regard metrics, each melodic fifth has five pitch units and each melodic third has three. Remains to determine the length value of the numbers which follow. We take it that Hurrian composers would not have devised some obscure and complex method with which to express rhythm, after all, music indications are there to enlighten and not to obnubilate. We also assume, in the present interpretation, that each of the pitches in melodic thirds and fifths were equal in length. Our contention is that the last member of an interval was prolonged by a quantity defined by the number which follows. The only reasonable quantity would be:

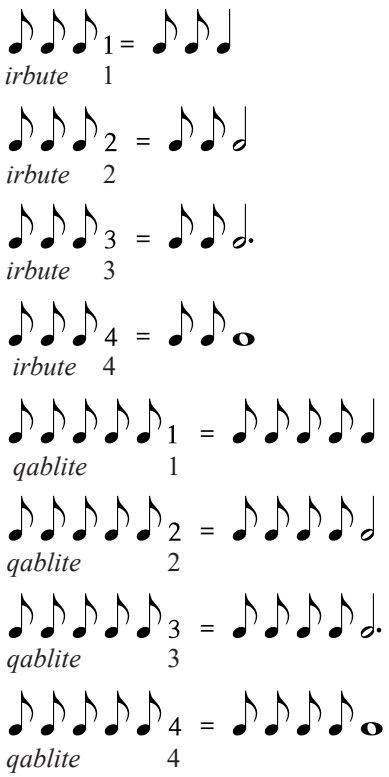


Figure. 62. explanation of the Hurrian rhythmic system.

When this method is applied to the intervals, and taking in consideration the damage of the tablet, lines 6 to 9 would have 36 beats each. Lines 6 and 10 would vary, as line 6 is introductory and line 10 jumps into line 6 as a catch-line for the repeat indicated both by the double winkelhaken and the lyrics. This regularity in the metrics of the piece further proves that the thirds and fifths were melodic and not harmonic.

Line 5. [*qablite* 3] = 10 [*irbute* 1] = 4 [*qablite* 3] = 10 [*šaḫri* 1] = 4 [*titimišarte* 10] = 22 + [uštamari..... ? = 50 (72?)

Line 6. [*titimišarte* 2] = 6 [*zirte* 1] = 4 [*šaḫri* 2] = 6 [*šaššate* 2] = 6 [*irbute* 3] = 8 [*šaššate* 2] = 6 = 36

Line 7. [*umbube* 1] = 6 [*šaššate* 2] = 6 [*irbute* 2] = 6 [*nadqabli* 1] = 6 [*titur qablite* 1] = 4 [*titimišarte* 2] = 6 = 34?

Line 8. [zirte 1] = 4 [*šaḫri* 2] = 6 [*šaššate* 4] = 10 [*irbute* 1] = 4 [*nadqabli* 1] = 6 [*šaḫri* 2] = 6 = 36

Line 9. [*šaššate* 2] = 6 [*šaḫri* 1] = 4 [*šaššate* 2] = 6 [*šaḫri* 1] = 4 [šaššate 2] = 6 [irbute 4] = 10 = 36

Line 10. [kitme 2] = 8 [qablite 3] = 10 [kitme 1] = 6 [qablite 2] = 8 [kitme 1] = 6 [qablite 3] = 10 = 48 (72?)

Note that Line 5 could equal 72 on account of the unknown value for *uštamari*; Line 7 could have been misread and could have a value of 36; Line 10 could have a value of 36 since the last interval [*qablite* 3] is a catch-line for line 5.

Conclusion

Figure 63 is my interpretation of text H6. It is a tonal interpretation. I do not mean that it is how it should be sung. The names of the intervals would have given modal indications which stemmed from tonal quantifications, or that modal originals were translated as a tonal expressions - which is my preferred option, as the modal certainly preceded the tonal.

Although this notational method has been considered as a 'primitive' system by Universalists such as Hagel, I contend that it was most certainly the basis for the Maqamian system which flourished with the advent of Islam and which is certainly in general use today in the Western Orient, apart from the rhythmical aspect which has not survived.

However, it was certainly much more advanced than Classical Greek and later Western Mediaeval notational systems. It shows a persistent usage of consecutive and conjoined thirds (fifths being made of two conjoined thirds). This structure is typical of Near-Eastern modal semiotics as it is continued to this day in the Levantine Aramaic and Syriac traditions.

But the proof is always in the pudding, and in the Spring of 2011, in Damascus, at the Dar al-Assad Opera House, I presented my interpretation of H6 with some emotion, as the original tablet was resting only a few hundred metres away. I was quite anxious about reactions from Maqam masters present. To the contrary, some started to hum as if they had known the music from some distant memory firmly anchored in their unconscious. Later, we engaged in enthusiastic discussions and the terms Bayati and and Hijazi recurred.

These musicians naturally felt the need to emphasise certain pitches in the sets. It became obvious that there is a direct link between Babylonian music theory, Hurrian songs and the Oriental Maqam.

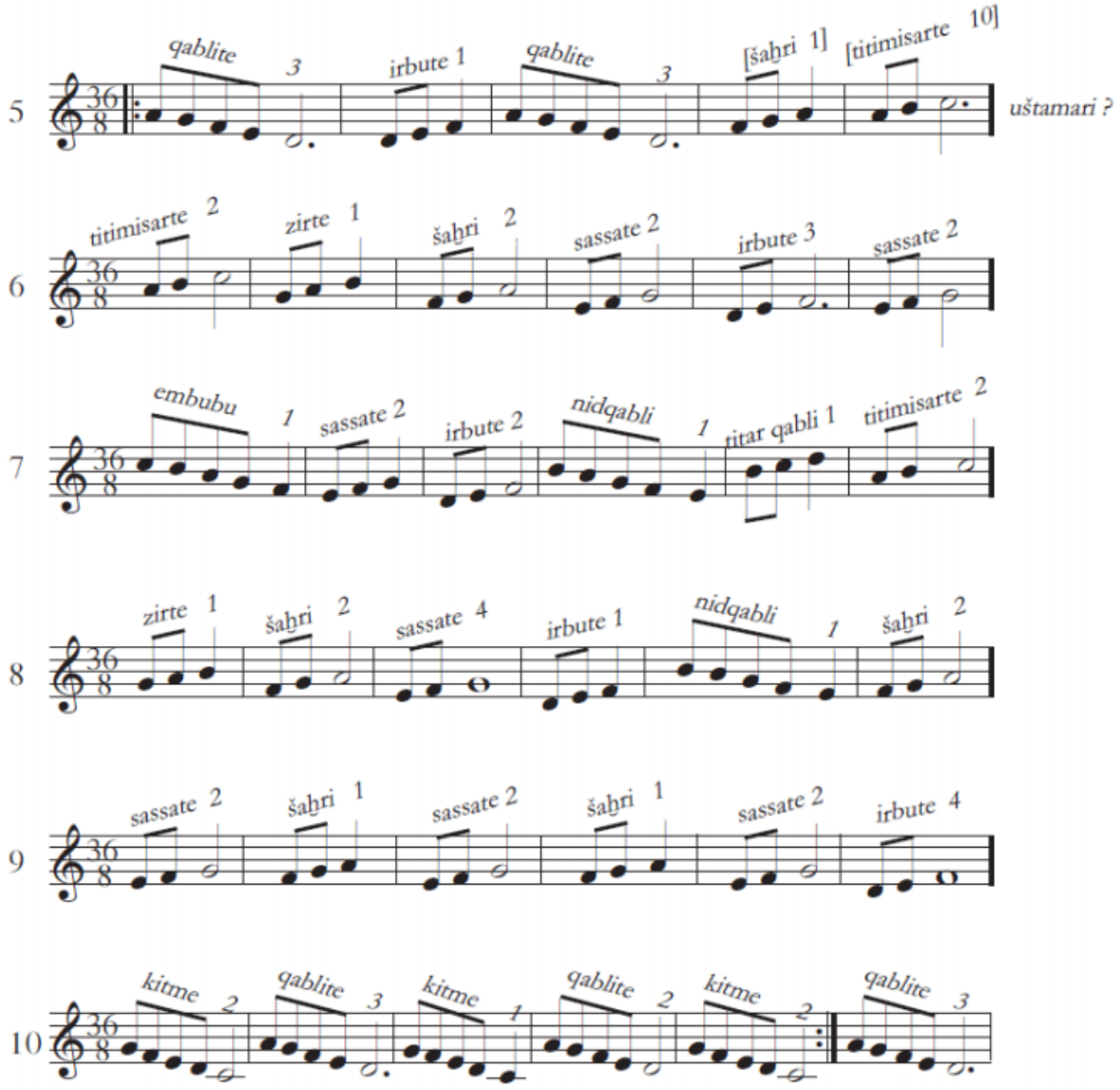
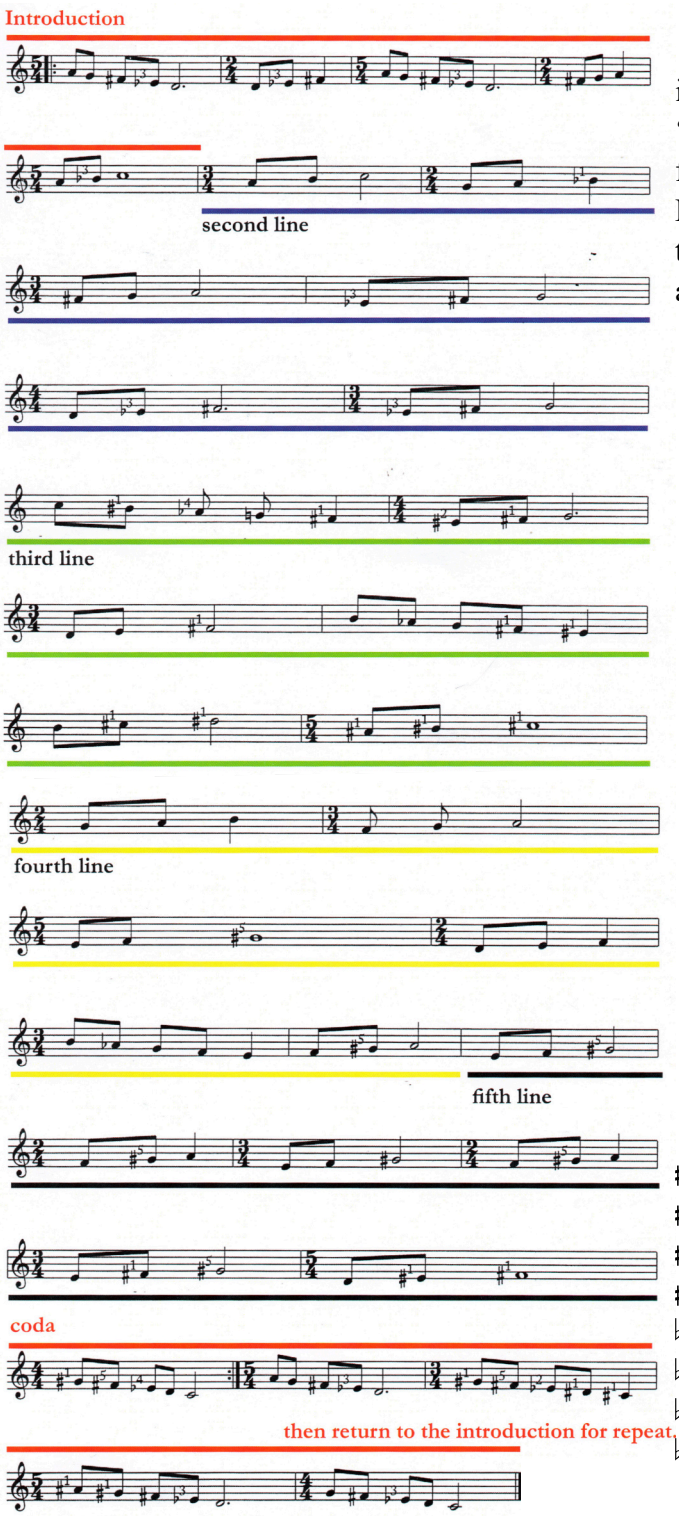



Figure 63. Tonal interpretation of text H.6

An analysis of this text is straightforward. The first and last lines would have had 72 (72/8) beats while the inner lines, 6, 7, 8 and 9 would have had each 32 (32/8). Surely this cannot be coincidental. Furthermore, line 10 sends back to line 5 for the repeat which is further indicated by the double winkelhaken which divides vocals from notations in these texts.



Author's 'Maqamian', or 'modal' interpretation of Hurrian song H.6. The 'Maqamian' intonation has been made from suggestions from Damascus Maqam experts and implemented with the collaboration of Rozy Azar-Beyhom and Amine Beyhom from Beirut.

♯1 = 1 comma sharper = +22.64 cents
♯2 = 2 commata sharper = +45.28 cents
♯3 = 3 commata sharper = +67.92 cents
♯4 = 4 commata sharper = +113.2 cents
♭1 = 1 comma flat = - 22.64 cents
♭2 = 2 commata flat = - 45.28 cents
♭3 = 3 commata flat = - 67.92 cents
♭4 = 4 commata flat = - 90.57 cents

Figure 64. Author's 'Maqamisation', or modal interpretation of text H6 in collaboration with experts in Damascus and with Rozy Azar-Beyhom and Amine Beyhom.

Tuis verbis, Cicero, utendum est:
'o tempora! o mores!'
videbis ardentes crudelitate simul ac superbia oculos!

Postlude

Never in the history of musicology has there been so much exaltation for ineptitude; manipulation of evidence; unashamed Hellenocentricism, Occicentricism; philological fudging, wilful chronological confusions, etc., etc. Many articles are rejected from publication because their views are loathed by some; scholars are ostracised from their participation at conferences while flawed hypotheses are welcome as long as their authors praise the organisers; articles and books differing from the views of the mob are seldom cited in references. In brief, the musicology of the Ancient Near-East, among other sciences, has been taken over by a small nucleus of individuals having constructed their mischievous incompetence, year after year, article after article, covering up aberrancies with more aberrations and avoiding at all costs the intrusion of musicological proficiency.

Among aberrancies, I will only mention the absurdity of heptatonic diatonic Neanderthalian flutes; the inanity of harmonic polyphony 3,400 years ago; the incongruity of Bronze Age heptatonism; the insanity of diatonism inscribed in our unconscious; the illogicality of instrumental anachronism, etc., etc.

This is why this book has no bibliography but just a few footnotes for which I make no apology. The theory which I expose in this work is not mine, it belongs to relativist epistemology. Should you wish to oppose its contents, you would be fighting a formidable philosophical concept and would advise that you stick to your views: '*Chacun son metier et les vaches seront bien gardées*.'